

EXHIBIT 46

India Nuclear Chronology

[2010-2008](#) | [2007-2005](#) | [2004](#) | [2003](#) | [2002](#) | [2001](#) | [2000](#) | [1999](#) | [1998](#) | [1997](#) | [1996](#) | [1995](#) | [1994](#) | [1993](#)
[1992](#) | [1991](#) | [1990](#) | [1989](#) | [1988](#) | [1987](#) | [1986](#) | [1985](#) | [1984](#) | [1983](#) | [1982](#) | [1981](#) | [1980](#) | [1979-1978](#)
[1977-1976](#) | [1975-1974](#) | [1973-1972](#) | [1971-1970](#) | [1969-1965](#) | [1964-1960](#) | [1959-1955](#) | [1954-1950](#) | [1949-1932](#)

Last update: December 2010

2010-2008

3 June 2010

The Russian government has officially confirmed the lease to India of the Nerpa nuclear submarine. The Akula-class submarine is expected to be delivered to India in October-November 2010.

—"Russia Declares Nerpa Lease," *The Indian Express*, June 3, 2010, www.indianexpress.com.

4 June 2010

The Indian government has reiterated its commitment to a nuclear liability framework. Speaking in Washington, Indian Foreign Minister S.M. Krishna said that, "the government of India is committed to putting in place a nuclear liability regime...(and) we look forward to U.S. companies investing in India."

—Narayan Lakshman, "India Committed to Nuclear Liability Regime: Krishna," *The Hindu*, June 4, 2010, www.hindu.com.

5 June 2010

Indian National Security Adviser Shiv Shankar Menon has said that proliferation networks in the region have negatively affected Indian security. In a speech in Singapore at the 9th International Institute of Strategic Studies Asia Security Summit, Menon said, "The world may now be at the proliferation tipping point in terms of both nuclear weapons and the militarization of space. For India, clandestine proliferation networks in our neighborhood have already adversely affected our security."

—"N-Proliferation Has Affected India's Security: Menon," *OutlookIndia.com*, June 5, 2010, <http://news.outlookindia.com>.

6 June 2010

Indian National Security Adviser dispelled concerns that about the security of India's nuclear assets. Speaking at the International Institute of Strategic Studies Asia Security Summit in Singapore, he told participants that they "don't need to worry about Left-wing extremism affecting the security of our nuclear assets."

—P.S. Suryanarayana, "Menon Allays Fears About Security of India's Nuclear Assets," *The Hindu*, June 6, 2010, www.hindu.com.

8 June 2010

The United States and France have asked Japan to conclude a nuclear agreement with India. This would allow

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companies from the two countries, including General Electric and Areva, to use components from Japanese suppliers for projects in India.

—"U.S. France Press For Japan-India Nuclear Deal — Report," Reuters, June 8, 2010, www.reuters.com.

11 June 2010

According to a senior scientist at the Department of Atomic Energy, India has carried out successful tests of a new advanced heavy water reactor. According to the scientist, the AHWR300-LEU Advanced Heavy Water Reactor produces lesser plutonium than pressurized water reactors (PWR). The reactor is likely to begin commercial operations by 2020.

—Iftikhar Gilani, "India Tests a New Heavy Water Reactor to Burn Thorium," *The Daily Times*, June 11, 2010, www.dailytimes.com.pk.

11 June 2010

The United States has said that it expects India to implement the latest United Nations Security Council sanctions imposed on Iran, according to U.S. Undersecretary of State William Burns.

—"US Expects India to Implement Iran Sanctions," *The Times of India*, June 11, 2010, <http://timesofindia.indiatimes.com>.

11 June 2010

The Department of Atomic Energy has issued guidelines dealing with nuclear imports through a new notification, "Guidelines for Implementation of Arrangements for Cooperation Concerning Peaceful Uses of Atomic Energy with Other Countries."

—R. Ramachandran, "DAE Notified as 'Competent Authority' to Approve All Nuclear Imports," *The Hindu*, June 11, 2010, www.hindu.com.

12 June 2010

The Indian Navy is establishing a new naval base on the eastern coast, 200 kilometers from Visakhapatnam, which will host the proposed fleet of nuclear-powered submarines. The navy's first indigenous nuclear submarine, INS Arihant, is currently under-going sea-trials.

—Suman Sharma, "Navy Creating a New Base for Nuke Submarines," *Daily News and Analysis*, June 12, 2010, www.dnaindia.com.

16 June 2010

The central government has reversed its decision to put in place an amendment to the proposed nuclear liability bill currently under consideration by the Parliament. The amendment would have deleted a clause which would have allowed a nuclear operator to exercise a 'right of recourse' vis-à-vis the suppliers if an accident is due to negligence on their part.

—"Government Backtracks on Nuclear Liability Change," *The Hindu*, June 16, 2010, www.hindu.com.

18 June 2010

New Delhi has informed Beijing that a nuclear agreement between China and Pakistan could have a negative fall out on Sino-Indian ties. The message was conveyed to the Chinese government through diplomatic channels.

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—C. Raja Mohan, "N-Deal with Pak Could Hit Ties, India Cautions China," *The Indian Express*, June 18, 2010, www.indianexpress.com.

19 June 2010

India will soon begin negotiations with the Republic of Korea on civilian nuclear cooperation. This was stated by Indian Foreign Minister S.M. Krishna in Seoul, who also said that such an agreement was important for India's "search for a more rational energy mix."

—P.S. Suryanarayana, "New Delhi, Seoul to Begin Talks on Civil Nuclear Cooperation," *The Hindu*, June 19, 2010, www.hindu.com.

26 June 2010

India has informed the United States that New Delhi should be exempted from any restrictions imposed by the Nuclear Suppliers Group on supply of enrichment and reprocessing technology. This comes prior to the meeting of the group in New Zealand.

—Indrani Bagchi, "India Tells US to Keep NSG Off Its Back," *The Times of India*, June 26, 2010, <http://timesofindia.indiatimes.com>.

29 June 2010

India and Canada signed a civilian nuclear cooperation agreement in Toronto. The accord still has to be ratified by the two countries before Canada can export nuclear technology to India. Indian Prime Minister Manmohan Singh termed the agreement as "breaking new ground in the history of our cooperation in this sector," and that "it reflects the change in international realities."

—TCA Srinivasa-Raghavan, "India, Canada Sign Civil Nuclear Deal," *The Hindu*, June 29, 2010, www.thehindu.com.

1 July 2010

India and Japan have conducted the first round of discussions on a civilian nuclear cooperation agreement. The talks, held in Tokyo, discussed "the guiding principles of how to conduct negotiations in the future."

—P.S. Suryanarayana, "Japan, India Hold Talks on Nuclear Pact," *The Hindu*, July 1, 2010, www.thehindu.com.

7 July 2010

The International Commission on Nuclear Nonproliferation and Disarmament (ICNND) has expressed its "concerns about the terms of the exemption approved by the Nuclear Suppliers Group for India's nuclear programs." In a statement, the commission said that it was concerned that India's exemption "did not require a strong new commitment to disarmament and non-proliferation objectives and measures." The commission recommended that in future any exports of nuclear equipment and technology to countries outside the Nonproliferation Treaty should be accompanied by two conditions — that the recipient country will "not conduct any nuclear test and implement a moratorium on the production of fissile material for weapon purposes, pending the entry into force of a fissile material production ban."

—P.S. Suryanarayana, "Disarmament Panel Concerned at Exemption for India," *The Hindu*, July 7, 2010, www.hindu.com.

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31 July 2010

The Atomic Energy Regulatory Board (AERB) is formulating new safety guidelines under which new nuclear power plants would have to be reinforced to withstand the impact of a plane crash. Companies building these reactors would have to incorporate reinforced shield structures as well as strengthened protection for storage pools containing nuclear fuel.

—Anika Gupta, "9/11 Effect: India Wants Plane Crash-Proof N-Power Plants," *Hindustan Times*, 31 July 2010.

1 August 2010

Atomic Energy Commission (AEC) chairman Srikumar Banerjee asserts that the first reactor at the Koodankulam nuclear facility is likely to go critical by the end of 2010.

—"First Reactor at Koodankulam to Go Critical by Year-end: AEC Chairman," *The Hindu*, 1 August 2010.

1 August 2010

India and the United States sign a bilateral agreement on the reprocessing of spent nuclear fuel in accordance with their '123' agreement on civilian nuclear cooperation. Under the latest agreement, India will be able to reprocess spent fuel at a new, dedicated and safeguarded installation.

—Narayan Lakshman, "Reprocessing Accord Signed," *The Hindu*, 1 August 2010.

21 August 2010

Indian sailors commence training onboard the Akula-class nuclear submarine, Nerpa, which the Indian Navy will receive from Russia on a ten-year lease later this year. The submarine has departed from its base on Russia's Pacific coast with at least 50 Indian sailors aboard for training and testing purposes.

—"Russian Akula N-Sub Handed Over to India, Homeward Bound," *The Times of India*, 21 August 2010.

22 August 2010

The Japanese government makes it clear that the prospects for civilian nuclear cooperation with India will depend on New Delhi's cooperation with international nuclear norms. In a statement in Delhi, visiting Japanese Foreign Minister Katsuya Okada says, "I don't think we can suggest that India should refrain from conducting a nuclear test, but if such a thing were to happen, Japan will have no option but to suspend cooperation."

—"Japan Warns India Against Future N-Test," *The Times of India*, 22 August 2010.

25 August 2010

Indian private sector companies object to certain provisions of the Civil Liability for Nuclear Damage Bill 2010. The Federation of Indian Chambers of Commerce and Industry (FICCI) writes, in a letter to Prime Minister Manmohan Singh, that clauses in the legislation which impose liability on the supplier for nuclear accidents would negatively impact the participation of Indian companies in nuclear energy projects.

—K. Balchand, "Nuclear Industry Objects to Clauses in Liability Bill," *The Hindu*, 25 August 2010.

26 August 2010

The Indian government asserts that it believes that Myanmar does not have nuclear weapons, but that New Delhi will continue to keep an eye on the situation in that country. Foreign Minister S.M. Krishna states in Parliament that, "Myanmar asserts that it has no nuclear program on its anvil. The government of India will have to believe.

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We will also gather through our own intelligence what is happening."

—"India Says Myanmar Has No Nukes," *The Times of India*, 26 August 2010.

26 August 2010

The Chinese government conveys to India that its nuclear cooperation initiatives with Pakistan are for peaceful objectives, according to Indian Foreign Minister S.M. Krishna, in response to a question in the upper house of Parliament, Rajya Sabha.

—"China Says Its Nuclear Cooperation with Pakistan Is for Peaceful Purposes," *The Hindu*, 26 August 2010.

26 August 2010

Prime Minister Manmohan Singh defends the proposed Civil Liability for Nuclear Damage Bill in Parliament, saying that the legislation would allow India to participate in nuclear trade with foreign suppliers and "end nuclear apartheid" against the country. Meanwhile, the legislation is passed by the lower house of Parliament, the Lok Sabha, after the government removes the controversial provision of "intent" in section 17(b) of the bill.

—Vinay Kumar, "'We Cannot Ignore the Nuclear Option,'" *The Hindu*, 26 August 2010; Vinay Kumar and J. Balaji, "'Intent' Dropped; Lok Sabha Adopts Nuclear Liability Bill," *The Hindu*, 26 August 2010.

31 August 2010

The Indian Parliament adopts the Civil Liability for Nuclear Damage Bill, after the upper house, the Rajya Sabha, gives its approval.

—Parliament Adopts Nuclear Liability Bill," *The Hindu*, 31 August 2010.

12 September 2010

India's Strategic Forces Command (SFC) proposes the addition of two new squadrons of nuclear-capable fighter planes. The SFC, which is tasked with managing the country's nuclear weapons, comes under the Nuclear Command Authority but has to depend on the Indian Air Force for fighter planes capable of delivering nuclear weapons. The SFC is a joint services command, and with this proposal seeks to have its own air-based assets.

—"Strategic Command to acquire 40 nuclear capable fighters," *The Hindustan Times*, 12 September 2010.

13 September 2010

The Russian government asks India for clarification regarding a provision of the civil nuclear liability law passed by the Indian Parliament a few weeks ago, which potentially imposes liability on suppliers of nuclear technology and materials in case of an accident. Russian Ambassador to India, Alexander M. Kadakin says, "We expect from the Indian side official clarification as regards the implementation mechanism of the respective paragraph of the nuclear liability bill. As per our knowledge, at present such position is being prepared."

—Sachin Parashar, "After U.S., Russia upset over N-law," *The Times of India*, 13 September 2010.

23 September 2010

Chairman of the Indian Atomic Energy Agency Srikumar Banerjee says that the state-owned Nuclear Power Corporation of India Limited is prepared to export Pressurized Heavy Water Reactors to other countries. The reactors would have a capacity of either 220MWe or 540MWe. In a speech at the IAEA General Conference in Vienna he also indicates that India is in the process of setting up a global center for nuclear energy cooperation for

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collaborative work on nuclear energy matters. Banerjee says, "India is expanding its uranium enrichment capacity, which will meet part of the requirements of light water reactors."

—"India ready to sell Pressurized Heavy Water Reactors," *The Hindu*, 23 September 2010.

29 September 2010

The United States government encourages New Delhi to come up with an arrangement that would allow U.S. companies to participate in India's nuclear power generation projects. This is in the context of India's newly-passed civilian nuclear liability legislation which holds nuclear suppliers potentially liable in case of a nuclear accident. Representatives from the nuclear industry have expressed concern over this provision of the legislation and its deviation from international standards.

—Ashish Kumar Sen, "U.S. raises N-liability concerns with Krishna," *The Tribune*, 29 September 2010.

9 October 2010

India and Japan begin the second round of negotiations on their proposed civilian nuclear agreement.

—"India-Japan talks on civil nuclear agreement begin," *The Hindu*, 9 October 2010.

11 October 2010

According to a news report, the Indian government is considering establishing a company to mine natural uranium in other countries. This entity could be along the lines of the state-owned Oil and Natural Gas Limited (ONGC) Videsh Limited (OVL).

—"Chavan rules out private participation in nuclear power sector," *The Hindu*, 11 October 2010.

11 October 2010

The Indian government does not have any plans to allow private sector entities into the atomic energy production field by amending the Atomic Energy Act. At a press conference, Minister of State for Science and Technology Prithviraj Chavan says that, "we are inviting the private sector to come in as minority partners and learn the tricks of the trade."

—"Chavan rules out private participation in nuclear power sector," *The Hindu*, 11 October 2010.

12 October 2010
India rejects a proposed provision in the civilian nuclear trade deal being negotiated with Japan under which Tokyo could suspend the agreement if New Delhi conducts a nuclear test.

—"India spurns nuke test clause in trade deal with Japan," Global Security Newswire, 12 October 2010.

13 October 2010

Indian Foreign Minister S.M. Krishna says that the Civil Liability for Nuclear Damage legislation, which was passed by the Parliament, will not be modified to amend provisions that place liability on nuclear suppliers. He says, "The question of amendments is never on the cards. We have explained to the United States the circumstances in which we had to go through with the bill and we have to work within the parameters of the legislation."

—"India Says Atomic Liability Law Won't Be Changed," Global Security Newswire, 13 October 2010.

19 October 2010

The German government expresses its hope that India will sign the Comprehensive Nuclear Test Ban Treaty (CTBT). After discussions with his Indian counterpart in New Delhi, German Foreign Minister Guido Westerwelle says that,

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"we are encouraged by signs that India could be prepared to sign the CTBT."

—Ashok Tuteja, "Germany hopes India signs CTBT," *The Tribune*, 19 October 2010.

20 October 2010

The Indian government seeks assistance from the United States in its quest for membership of the Nuclear Suppliers Group (NSG). If Washington were to agree to support India's case at the NSG, such assistance would presumably take the form of introducing a proposal in the group to relax the criteria for admittance.

—Pranab Dhal Samanta, "India to seek U.S. help for entry into NSG," *The Indian Express*, 20 October 2010.

22 October 2010

The Indian government informs the United States that the civil nuclear liability legislation passed by Parliament in August cannot be modified. New Delhi says that provisions of the act which provide Indian nuclear operators the right of recourse towards suppliers if an accident takes place cannot be overruled by guidelines that the government might introduce to facilitate the legislation's implementation.

—Siddharth Varadarajan, "India Resists Pushback on Nuclear Liability," *The Hindu*, 22 October 2010.

22 October 2010

David Headley, a U.S. national who conducted reconnaissance for the Pakistan-based terrorist organization Lashkar-e-Toiba (LeT), informs Indian investigators that his controller in the Pakistani intelligence agency Inter-Services Intelligence (ISI) directed him to conduct surveillance and video footage of the Bhabha Atomic Research Center in the Mumbai area. Headley's reconnaissance activities assisted LeT in conducting the November 2008 Mumbai attacks. He is currently in U.S. custody.

—"Mumbai Terror Scout Shot Footage of Indian Nuclear Site," Global Security Newswire, 22 October 2010.

25 October 2010

U.S. Undersecretary of State William Burns says that the Obama Administration is likely to end restrictions on the sale of sensitive nuclear technology to India.

—"U.S. Seen Signaling Plans to Drop Indian Export Limits," Global Security Newswire, 25 October 2010.

26 October 2010

The United States government welcomes New Delhi's decision to sign the Convention on Supplementary Compensation (CSC) on nuclear damages. According to U.S. officials, "Signing up to CSC is a very positive step, if and when it happens. That will then allow the companies to begin commercial negotiations required for fulfilling the promise of the nuclear deal."

—"U.S. welcomes India's move to ink n-damages pact," *The Indian Express*, 26 October 2010.

28 October 2010

India signs the Convention on Supplementary Compensation for Nuclear Damage (CSC). The document is signed in Vienna at the International Atomic Energy Agency by Dinkar Khullar, the Indian ambassador to Austria.

—Siddharth Varadarajan, "India Signs Nuclear Liability Treaty," *The Hindu*, 28 October 2010.

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30 October 2010

Indian National Security Adviser Shiv Shankar Menon announces that India and South Korea have finalized an agreement on civilian nuclear cooperation. The agreement is likely to be signed next year.

—Ruchika M. Khanna, "N-deal struck with Korea, on 'fast track' with Japan," *The Tribune*, 30 October 2010.

4 November 2010

United States Secretary of Commerce Gary Locke says that during President Barack Obama's visit to India in early November, Washington might remove restrictions on the sale of sensitive dual-use equipment to India. In an interview, he says that, "We will be able to make a significant announcement about the modernization of export control systems between the U.S. and India."

—Yashwant Raj, "Top official confirms: U.S. to lift hi-tech nuclear sanctions," *The Hindustan Times*, 4 November 2010.

30 April 2010

The Indian Atomic Energy Regulatory Board (AERB) has issued a directive to Delhi University asking it to halt all activities that include use of radiation sources. This follows the recent death of an individual at a Delhi scrap shop who was exposed to radioactive material (Cobalt-60) from an old gamma cell which was disposed by the university's chemistry department in an unauthorized manner, violating the Atomic Energy (Safe Disposal of Radioactive Waste) Rules and Atomic Energy (Radiation Protection) Rules.

—"AERB's Directive to Delhi University on Radiation Sources," *The Hindu*, April 30, 2010, www.hindu.com.

17 April 2010

The Atomic Energy Regulatory Board (AERB) has said that after scanning hundreds of shops in a Delhi scrap market, nuclear scientists did not find any further radioactive sources. In recent weeks, nuclear experts detected 11 sources of radiation from the Mayapuri scrap market in the area where Cobalt-60 was found. Several individuals had been injured from radioactive material there.

—"No New Radioactive Source in Delhi: AERB," *The Times of India*, April 17, 2010, <http://timesofindia.indiatimes.com>.

14 April 2010

Speaking at the Nuclear Security Summit in Washington, Indian Prime Minister Manmohan Singh strongly urged global nuclear disarmament as the "best guarantor of nuclear security." He also said that there should be "zero tolerance for individuals and groups which engage in illegal trafficking in nuclear items."

—Siddharth Varadarajan, "Manmohan Links Nuclear Security, Disarmament," *The Hindu*, April 14, 2010, www.hindu.com; Siddharth Varadarajan, "India wants 'zero tolerance' of nuclear traffickers," *The Hindu*, April 14, 2010, www.hindu.com.

14 April 2010

At the Nuclear Security Summit in Washington, Indian Prime Minister Manmohan Singh announced the establishment of a Global Center for Nuclear Energy Partnership. The Prime Minister said that, "we visualize this to

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be a state of art facility based on international participation from the International Atomic Energy Agency (IAEA) and other interested foreign partners. The Center will consist of four schools dealing with Advanced Nuclear Energy System Studies, Nuclear Security, Radiation Safety, and the application of Radioisotopes and Radiation Technology in the areas of healthcare, agriculture and food."

—K.P. Nayar, "Ice-Breaker Centre," *The Telegraph*, April 14, 2010, www.telegraphindia.com.

9 April 2010

Four persons working in a scrap market in West Delhi's Mayapuri area have suffered serious burns after being exposed to radioactive emissions from scrap material.

—Devesh K. Pandey, "Scrap dealer, workers suffer burns from radiation exposure," *The Hindu*, April 9, 2010, www.hindu.com.

3 April 2010

The commercial agreement between the Nuclear Power Corporation of India Limited (NPCIL) and Westinghouse Electric might be delayed due to defects in the design of the reactor that Westinghouse plans to supply to India.

—"Design Flaws in Westinghouse Reactor May Delay India Contract," *The Hindu*, April 3, 2010, www.hindu.com.

30 March 2010

The United States and India have formally announced an agreement on reprocessing of spent nuclear fuel by India. According to U.S. Ambassador to India, Tim Roemer, the agreement was "part of the great, win-win narrative of the U.S.-India global partnership."

—Rama Lakshmi & Steven Mufson, "U.S., India Reach Agreement on Nuclear Fuel Reprocessing," *The Washington Post*, March 30, 2010, www.washingtonpost.com.

23 March 2010

Indian Foreign Minister S.M. Krishna has urged the United States to keep in mind Pakistan's track record in nuclear proliferation before any initiative on nuclear cooperation. He said that Washington should take a "holistic view... the U.S. should consider Pakistan's track record before any deal."

—"US Must Consider Pak Track Record Before N-Deal: Krishna," *The Daily Times*, March 23, 2010, www.dailytimes.com.pk.

19 March 2010

The Australian government has reiterated its opposition to the export of uranium to India. Australian Trade Minister Simon Crean said that they would not supply uranium till India signs the Nuclear Nonproliferation Treaty.

—"Australia Remains Firm Against Sale of Uranium to India," *The Hindu*, March 19, 2010, <http://beta.thehindu.com>.

19 March 2010

The Department of Atomic Energy (DAE) has said that the delay in introduction of the nuclear liability bill would adversely affect the schedule of construction of new nuclear plants. According to a DAE official, "till the nuclear liabilities bill is passed, the commercial agreements cannot be finalized."

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—Amitabh Sinha, "Bill Delay Will Disturb N-Plants Schedule: DAE," *The Indian Express*, March 19, 2010, www.indianexpress.com.

18 March 2010

The Nuclear Power Corporation of India Limited (NPCIL) and the French company Areva are finalizing a deal for construction of two 1,650 MWe European Pressurized Reactor plants in Jaitapur, Maharashtra.

—T. Ramakrishnan, "NPCIL, Areva Finalising Contracts for Two Reactors," *The Hindu*, March 18, 2010, www.hindu.com.

14 March 2010

The Indian and Russian governments are considering establishing a joint venture that would produce nuclear fuel in India. According to Rosatom chief Sergei Kiriyenko, "A project to build a factory in India for the production of nuclear fuel is under consideration."

—Vladimir Radyuhin, "Plan for Nuclear Fuel Plant in India," *The Hindu*, March 14, 2010, <http://beta.thehindu.com>.

12 March 2010

New Delhi and Moscow signed three nuclear pacts under which Russia will build 12 nuclear plants in India. Six of these plants will be in Kudankulam, Tamil Nadu, and six others will be in Haripur, West Bengal.

—"Russia to Build 12 Nuclear Plants in India," *The Times of India*, March 12, 2010, <http://timesofindia.indiatimes.com>.

9 March 2010

India has urged the international community to focus beyond uranium for atomic plants, recommending an increase in research on thorium. Speaking at the ongoing global conference on nuclear energy, Atomic Energy Commission Srikumar Banerjee said that the international community should support India's three-stage nuclear program. He also said: "The constraint in relying only on uranium was never addressed in this conference. The world has to pay attention to uranium 238 using plutonium in a closed fuel cycle — this transition is essential for the whole world. But this is not enough. Unless thorium is used, it will not be possible to have sustainable energy on this planet."

—Sandeep Dikshit, "Revive R&D in Thorium, Says India," *The Hindu*, March 9, 2010, www.hindu.com.

9 March 2010

India and the United States have resolved the major differences between the two sides on an agreement on reprocessing spent fuel originating from the U.S. Negotiations between the two teams concluded last week and the agreed text now has to be approved by the political leadership of the two countries.

—Pranab Dhal Samanta, "India, US Iron Out Key Differences Over Reprocessing," *The Indian Express*, March 9, 2010, www.indianexpress.com.

14 February 2010

Pakistani Prime Minister Yousaf Raza Gilani has called upon the European Union to place Pakistan on par with India and supply it with civilian nuclear technology. He made these remarks at a meeting with EU ambassadors in Islamabad.

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—"PM Seeks India-Type Access to Civil Nuclear Technology," *Daily Times*, 14 February 2010, www.dailytimes.com.pk.

3 February 2010

The Director of United States National Intelligence Dennis Blair has stated that according to available information, the Pakistani military has kept secure the country's nuclear weapons. Blair told the House Intelligence Committee that, "the Pakistan army takes very seriously the security of its weapons, and they know the catastrophic consequences -- primarily for Pakistan -- if they were to get loose." Relatedly, a day earlier, the head of the U.S. Defense Intelligence Agency Lt. Gen. Ronald Burgess told the Senate Intelligence Committee that, "We have confidence in Pakistan's ability to safeguard its nuclear weapons, though vulnerabilities exist."

—"Pakistan nuclear arsenal safe: Top US spy chief," AFP, 3 February 2010, www.google.com/hostednews.

25 January 2010

Pakistan has termed a "clear and present danger" from India as a reason for it to prevent any progress on the fissile material cut-off treaty negotiations under the current agenda. According to the Pakistani Ambassador to the Conference on Disarmament, Zamir Akram: "A fissile material cut-off treaty that only bans future production of fissile material is unacceptable to Pakistan. It would only accentuate the disparity and imbalance that exists and that simply is not acceptable."

—"Pakistan Rejects Atom Bomb Material Cut-Off Talks, Cites Danger from India," Yahoo New India, 25 January 2010, <http://in.news.yahoo.com>.

23 January 2010

Islamabad has informed major powers that it will not accept the commencement of international negotiations on a fissile material cutoff treaty in the near future. Pakistani Ambassador to the Conference on Disarmament, Zamir Akram was quoted as making a statement to this effect. Akram also said, "There are basic conditions about the nature of the discussions, whether it will be simply a cut-off treaty or take account the issue of stocks."

—"Pakistan Rules Out Fissile Talks with World Powers for Now," *The Daily Times*, 23 January 2010, www.dawn.com.

22 January 2010

The Executive Committee of the National Economic Council (ECNEC) has approved the Nuclear Fuel Enrichment Plan (NFEP) project to be constructed in Mianwali.

—"ECNEC Approves N-Fuel Enrichment Plant in Mianwali," *The Daily Times*, 22 January 2010, www.dailytimes.com.pk.

22 January 2010

Pakistan has asked the United States to recognize it as a nuclear state and commence civilian nuclear cooperation with Islamabad. This message was conveyed by Pakistani Defence Minister Ahmad Mukhtar to visiting U.S. Defense Secretary Robert Gates.

—"Pakistan Asks US to Enter Into Civilian-nuclear Energy Cooperation," *The Daily Times*, 22 January 2010, www.dailytimes.com.pk.

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20 January 2010

Pakistan has blocked progress towards adoption of the agenda for 2010 at the Conference on Disarmament in Geneva. Pakistani Ambassador Zamir Akram called for the proposed agenda to be broadened to include regional conventional arms control and a regime on missile issues. According to Akram, Islamabad did not want to participate in an agenda that was "frozen in time."

—"Pakistan Blocks Agenda at UN Disarmament Conference," *The Daily Times*, 20 January 2010, www.dawn.com.

18 January 2010

The Pakistani Foreign Office has rejected reports in the *Sunday Times* of London that the United States had trained elite troops to recover Pakistan's nuclear weapons and materials that are seized by militant groups. Foreign Office spokesman Abdul Basit termed the report "rubbish and a figment of the imagination of the reporter."

—"Report is 'Rubbish': FO," *The Daily Times*, 18 January 2010, www.dailytimes.com.pk.

17 January 2010

The Sunday Times of London stated in an article that the United States army has put together an elite unit charged with interdicting and recovering any Pakistani nuclear weapons and materials that are seized by militant groups.

—Christina Lamb, "Elite US Troops Ready to Combat Pakistani Nuclear Hijacks," *The Times*, 17 January 2010, www.timesonline.co.uk.

16 January 2010

Prime Minister Yousaf Raza Gilani has asserted that Pakistan's nuclear weapons are secure and that this status will not change under any circumstances. He made these remarks at a meeting of the Strategic Plans Division (SPD).

—"Country's Nukes In Safe Hands: Gilani," *The Daily Times*, 16 January 2010, www.dailytimes.com.pk.

26 December 2009

According to Pakistani news reports, five United States citizens, who were arrested this month for planning terrorist attacks in Pakistan, have claimed one of their intended targets was the Chashma nuclear power plant.

—"US Suspects Planned to Target Chashma Nuclear Plant," *The Daily Times*, 26 December 2009, www.dailytimes.com.pk.

11 December 2009

Pakistan has asserted that any assistance being provided by major powers to India's nuclear weapons program would be detrimental to peace and stability in the region. The statement was made by Foreign Ministry spokesman Abdul Basit.

—Nirupama Subramanian, "Pakistan Resents Support to India's Nuclear Programme," *The Hindu*, 11 December 2009, www.thehindu.com.

December 8, 2009

Three individuals have been arrested in Mumbai after 5 kilograms of depleted uranium was recovered from them. After apprehension of the individuals, the material was sent to the Bhabha Atomic Research Center near Mumbai for testing, where it was confirmed that the substance was depleted uranium.

—"3 Held in Mumbai with Suspected Radioactive Material," *IBNLive.com*, December 8, 2009, <http://ibnlive.in.com>.

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December 8, 2009

India and Russia signed a long-term civil nuclear cooperation agreement in Moscow under which Russia will construct an additional four nuclear reactors in India and provide uninterrupted supply of nuclear fuel. The pact was signed by the Indian Prime Minister Manmohan Singh and Russian President Dmitry Medvedev.

—Vladimir Radyuhin and Sandeep Dikshit, "Nuclear Pact Signed With Russia," *The Hindu*, December 8, 2009;
Rajeev Deshpande, "From Russia With Love: 4 New Nuclear Reactors," *The Times of India*, December 8, 2009.

December 1, 2009

India voted for a resolution at the International Atomic Energy Agency (IAEA) calling for an immediate halt to uranium enrichment by Iran on November 27. According to news reports, New Delhi's vote against Tehran was in large part, due to the Indian government's concern that any other posture (voting against or an abstention) would have raised questions about India's safeguards agreement with the IAEA.

—Pranab Dhal Samanta, "Iran Vote: India Prompted by Safeguards Pact with IAEA," *The Indian Express*, December 1, 2009, www.indianexpress.com.

November 29, 2009

India and Canada have completed negotiations on a civilian nuclear cooperation agreement on the sidelines of the Commonwealth Heads of Government Summit in Port-of-Spain, Trinidad and Tobago.

—"India, Canada Reach Civil Nuclear Agreement," *The Times of India*, November 29, 2009, timesofindia.indiatimes.com.

November 29, 2009

About 45 employees at the Kaiga atomic power station in the southern Indian state of Karnataka suffered radiation poisoning after radioactive heavy water contaminated the drinking water supply. The employees were found to have a "mildly higher level of radiation" than is permissible. However, according to the report, all the employees tested were found to be normal and were able to go back to their duties. In the meantime, the Nuclear Power Corporation, which runs the facilities, is conducting investigations.

—Prashanth G.N, "N-Plant Radiation Leak in Karnataka Leaves 45 Staffers Sick," *The Times of India*, November 29, 2009, timesofindia.indiatimes.com.

November 25, 2009

During Indian Prime Minister Manmohan Singh's state visit to the United States, President Barack Obama reaffirmed Washington's "commitment to fully implement the U.S.-India civil nuclear agreement." The two sides are still negotiating an agreement on fuel reprocessing.

—Malini Parthasarathy, "Fully Committed to Implementing Civil Nuclear Deal, Says Obama," *The Hindu*, November 25, 2009, www.hindu.com.

November 25, 2009

The Rajasthan Atomic Power Station (RAPS)'s fifth nuclear power reactor, with a capacity of 220 MWe, has been commissioned. It is India's 18th nuclear reactor and brings the overall nuclear power generation capacity to 4,340 MWe. It is a Pressurized Heavy Water Reactor (PHWR) and has been built by the Nuclear Power Corporation of

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India Limited (NPCIL). The reactor uses Russian-supplied uranium fuel and will be covered by International Atomic Energy Agency (IAEA) safeguards.

—T.S. Subramania, "RAPS' Fifth Nuclear Reactor Attains Criticality," *The Hindu*, November 25, 2009, www.hindu.com.

November 20, 2009

The union cabinet has approved the Civil Nuclear Liability Bill under which compensation for a nuclear accident is capped at Rs. 2,500 crores (approx. \$ 535 million). Under the legislation, which has to be passed by the Parliament, the operator of the nuclear facility is responsible for paying compensation, rather than the foreign supplier or firm building the plant. Essentially, the state-owned Nuclear Power Corporation of India Limited (NPCIL) assumes responsibility for compensation, since private firms are allowed to participate in nuclear power generation to a maximum of a 26% stake. Subsequent to the legislation's approval by parliament, New Delhi will then become part of the international convention on liability in the civil nuclear sector.

—"With Eye on US, Cabinet Green Signals N-Liability Bill," *The Times of India*, November 20, 2009, timesofindia.indiatimes.com.

November 17, 2009

Canadian Prime Minister Stephen Harper expressed his hope that a nuclear agreement between Canada and India would be concluded soon. The agreement would allow Canadian firms to supply nuclear technology and uranium to India.

—"Canada for Early N-Pact With India," *The Tribune*, November 17, 2009, www.tribuneindia.com.

November 15, 2009

According to the director of the Bhabha Atomic Research Center (BARC), Srikumar Banerjee, the 40 MW CIRUS reactor based at the complex, will be shut down by December 2010, in accordance with the separation plan of the Indo-U.S. nuclear agreement.

—"Research Reactor at BARC to be Shut Down by December 2010," *The Times of India*, November 15, 2009, timesofindia.indiatimes.com.

November 6, 2009

The civilian nuclear cooperation agreement signed between India and France in September 2008 permits reprocessing of spent fuel from French-origin nuclear reactors under safeguards and also provides assurances of lifetime fuel supply for the reactors, according to the public disclosure of the agreement following its approval by the French Senate. The agreement still has to be approved by the National Assembly's lower house for ratification and subsequent entry into force.

—R. Ramachandran, "Indo-French Deal Gives Assurance of Lifetime Supply of Nuclear Fuel for French Reactors," *The Hindu*, November 6, 2009, www.thehindu.com.

November 6, 2009

An Indian technical team has determined that a ship anchored off the coast of the western state of Gujarat, the Platinum-II, is not carrying any radioactive or hazardous waste. The ship is registered in the Republic of Kiribati.

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—Aarti Dhar, "No Radioactive Material Found on Ship at Alang," *The Hindu*, November 6, 2009, www.thehindu.com.

October 27, 2009

The Indian government's Ministry of Commerce issued an order banning export of any materials and equipment that could assist North Korea's nuclear, missile and any other weapons of mass destruction-related plans. The order is in accordance with United Nations Security Council resolutions on this matter and was issued through a notification of the Directorate General of Foreign Trade.

—"India Bans Trade of Nuke Items with North Korea," *OutlookIndia.com*, October 27, 2009, news.outlookindia.com.

October 24, 2009

Indian foreign secretary, Nirupama Rao has expressed concern over the security of Pakistan's nuclear weapons after the attack on a strategically-important Pakistani military base at Kamra.

—"India Hopes Pakistan Nuclear Arsenal is Safe," *The Hindu*, October 24, 2009, www.thehindu.com.

August 12, 2009

The Nuclear Power Corporation of India Limited (NPCIL) has approved the proposal for construction of a nuclear power plant at Kovvada in Srikakulam district of the state of Andhra Pradesh. The union cabinet is now likely to consider NPCIL's collaboration with an American firm to construct a 6,000-MW light reactor.

—Y. Mallikarjun, "Kovvada Nuclear Plant: Cabinet Nod Awaited," *The Hindu*, August 12, 2009, www.hindu.com.

August 10, 2009

Indian officials have detained and inspected a North Korean ship, the MV Mu San, near the Indian territories of Andaman and Nicobar Islands in the Bay of Bengal. Indian nuclear scientists checked to see if the ship had been carrying any nuclear or radiological materials. The ship was detained under the June 2009 United Nations Security Council resolution which following Pyongyang's nuclear test in May.

—Lydia Polgreen, "India Searches N. Korean Ship for Nuclear Materials," *The New York Times*, August 10, 2009, www.nytimes.com.

August 1, 2009

Indian External Affairs Minister S.M. Krishna has stated that that the G-8 resolution on banning the transfer of enrichment and reprocessing technologies to countries outside the Nuclear Nonproliferation Treaty (NPT) is "not a legally binding document" and expressed the hope that specific countries will conclude civilian nuclear cooperation agreements with India on a bilateral level.

—"G8 Curb on Nuclear technology Transfer Not Legally Binding — India," *BBC Monitoring South Asia — Political*, August 1, 2009, *Lexis-Nexis*.

July 26, 2009

India launched its first nuclear submarine, the 6,000-ton INS Arihant, for sea trials. The submarine will have the capability to launch ballistic missiles over a range of 700 km after its deployment in a few years.

—"India Launches Nuclear Submarine," *BBC News*, July 26, 2009, <http://news.bbc.co.uk>.

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July 1, 2009

India and Kazakhstan are negotiating a bilateral agreement on the civilian nuclear energy cooperation, according to Kairat Umarov, the Kazakh ambassador to India.

— "India, Kazakhstan Working on Inter-Governmental Nuke Energy Cooperation Pact," AndhraNews.net, July 1, 2009, www.andhranews.net.

April 27, 2009

India is interested in selling small nuclear reactors to Malaysia for power generation purposes, according to a senior official of the Nuclear Power Corporation of India Limited (NPCIL), speaking to the official Malaysian news agency Bernama. Currently, India is the world's only producer of 220 MW pressurized heavy water reactors.

—P Vijian, "India Keen to Sell Nuclear Reactors to Malaysia," Bernama, BBC Monitoring Asia Pacific — Political, April 27, 2009.

April 20, 2009

The Russian government has advocated that India should join the International Uranium Enrichment Center at Angarsk in order to provide assurances of fuel supply to India.

—Ann MacLachlan, "Russia Said to Woo India as Partner in Angarsk IUEC," *NuclearFuel*, April 20, 2009.

April 10, 2009

The Russian state-owned TVEL has supplied the first shipment of 30 tons of uranium pellets for India's heavy water reactors. A total of 2,000 metric tons of uranium pellets will be supplied under the February 2009 contract signed between the two sides.

— "Russia delivers first batch of nuclear fuel to India," ThaIndian News, April 10, 2009, www.thaindian.com.

March 23, 2009

The Board of Governors of the International Atomic Energy Agency (IAEA) have approved the Additional Protocol for India. This step partly fulfills India's obligation to separate its nuclear facilities into civilian and military and place the civilian facilities under international safeguards.

—Daniel Horner, "Additional Protocols for UAE, India Approved by IAEA Board," *NuclearFuel*, March 23, 2009.

March 7, 2009

India has asked the United States to commence negotiations for establishing "arrangements and procedures" for reprocessing American spent fuel in India. The bilateral "123" agreement on civilian nuclear cooperation consents to reprocessing rights for India, but only after New Delhi establishes a dedicated nuclear facility to reprocess nuclear material under International Atomic Energy Agency (IAEA) safeguards and concludes an agreement with the United States on the "arrangements and procedures under which such reprocessing will take place in this new facility."

—Siddharth Varadarajan, "Reprocessing Request is the First test of Nuclear Deal Under Obama," *The Hindu*, March 7, 2009, www.hindu.com.

February 11, 2009

Indian and Russian government agencies have signed agreements for the supply of 2,000 tons of uranium pellets

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for India's pressurized heavy water reactors as well as low enriched uranium pellets for boiling water reactors. These uranium batches would be covered by International Atomic Energy Agency (IAEA) safeguards.

—"Russia Agrees India Nuclear Deal," BBC News, February 11, 2009, <http://news.bbc.co.uk>.

February 5, 2009

The French company Areva has concluded a deal with the Nuclear Power Corporation of India Limited (NPCIL) to construct at least two nuclear power plants in India worth about \$10 billion. The number of reactors could increase to as many as six.

—Heather Timmons, "French Company Joins Indian Utility in a Deal for Nuclear Plants," *The New York Times*, February 5, 2009.

February 2, 2009

India and the International Atomic Energy Agency (IAEA) signed an agreement on the "Application of Safeguards to Civilian Nuclear Facilities." The agreement was signed by IAEA Director General Mohamed El Baradei and the Indian ambassador to the IAEA, Saurabh Kumar.

—International Atomic Energy Agency, February 2, 2009, www.iaea.org.

January 24, 2009

India and Kazakhstan signed a bilateral civilian nuclear cooperation agreement as part of which the Central Asian state will supply uranium fuel for Indian nuclear reactors. This deal comes through a Memorandum of Understanding between the Nuclear Power Corporation of India Limited (NPCIL) and KazAtomProm, which also covers potential joint exploration for uranium in Kazakhstan.

—"India, Kazakhstan Sign Nuclear Pact," ExpressIndia, January 24, 2009, www.expressindia.com.

December 19, 2008

The Nuclear Power Corporation of India Limited (NPCIL) and the French nuclear company Areva have signed an agreement for the supply of 300 tons of uranium to Indian reactors under International Atomic Energy Agency (IAEA) safeguards. This is the first such agreement since the Nuclear Suppliers Group (NSG) admitted India into international nuclear trade.

—"French Firm to Supply Uranium for India Nuclear Plants," BBC Monitoring South Asia — Political, December 19, 2008, Lexis-Nexis.

December 5, 2008

India and Russia have signed an agreement for the construction of four nuclear reactors by Russia at Kudankulam, in the southern Indian state of Tamil Nadu. This is in addition to two other reactors that Russia is already constructing at that site.

—"India-Russia Nuclear Deal Signed," *BBC News*, December 5, 2008, <http://news.bbc.co.uk>.

November 10, 2008

An accident aboard a Russian Akula-II class submarine undergoing sea trials in the Sea of Japan is likely to delay India's plans to acquire the vessel on a 10-year lease. The submarine has been taken of sea trials and transferred to a shipyard for repairs.

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—"Russian Submarine Accident Could delay Indian Navy Procurement," BBC Monitoring South Asia — Political, November 10, 2008, Lexis-Nexis.

October 11, 2008

Indian External Affairs Minister Pranab Mukherjee and U.S. Secretary of State Condoleezza Rice signed the bilateral nuclear agreement between the two countries, the process for which first began in July 2005. According to Mukherjee the agreement is legally binding on both sides and that, "it is also the first step to India's cooperation with the rest of the world in civil nuclear energy."

—Sridhar Krishnaswami, "India, US Sign 'Path-breaking' Nuclear Deal," *Press Trust of India*, BBC Monitoring South Asia — Political, October 11, 2008, Lexis-Nexis.

October 9, 2008

U.S. President George W. Bush signed into law the "United States-India Nuclear Cooperation Approval and Nonproliferation Enhancement Act. President Bush stated that "India can count on reliable fuel supplies (from US) for its reactors. We will give consent to India for advanced reprocessing."

— "Bush Signs India-US Nuclear Deal into Law," BBC Monitoring South Asia — Political, October 9, 2008, Lexis-Nexis.

October 2, 2008

The United States Senate has approved a bilateral nuclear cooperation agreement with India which will allow New Delhi to acquire nuclear technology and equipment from the United States. The Indian government has reiterated that it still has the right to conduct nuclear tests, but Washington has stated that in such a scenario the agreement could be cancelled. The framework for this agreement (also called the 123 agreement) was first agreed to in July 2005 by President George Bush and Prime Minister Manmohan Singh. With the Senate endorsement, the agreement cannot be signed into law by President Bush.

— "US Approves Indian Nuclear Deal," BBC News, October 2, 2008, <http://news.bbc.co.uk>.

September 30, 2008

India and France signed a bilateral nuclear cooperation agreement that will allow the sale of French nuclear reactors to India. In January this year the two countries had signed a framework agreement for civil nuclear co-operation.

—"India and France in Nuclear Deal," BBC News, September 30, 2008, <http://news.bbc.co.uk>.

September 7, 2008

The Nuclear Suppliers Group (NSG) has removed the 34-year ban on India's participation in international nuclear trade and supported the U.S.-India nuclear agreement. Indian Prime Minister Manmohan Singh said, "This is a forward-looking and momentous decision. It marks the end of India's decades-long isolation from the nuclear mainstream and of the technology denial regime."

—Rama Lakshmi and Glenn Kessler, "International Group Backs Nuclear Accord for U.S., India," *The Washington Post*, September 7, 2008.

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September 6, 2008

The Indian external affairs ministers, Pranab Mukherjee has affirmed that New Delhi remains "committed to a voluntary, unilateral moratorium on nuclear testing." This statement comes in the midst of the Nuclear Suppliers Group meeting in Vienna to discuss removal of the ban on India's participation in international nuclear trade.

September 3, 2008

The Chinese government has not yet decided its position on the proposal to allow India to participate in nuclear trade at the Nuclear Suppliers Group (NSG). Ahead of the NSG meeting on this issue, a Chinese foreign ministry spokesman said that in context of the Indo-U.S. nuclear deal, peaceful use of nuclear energy has to be balanced against fears of proliferation of weapons of mass destruction.

—Saibal Dasgupta, "Beijing Urges Caution on Nuclear Fuel Deal With India," *The Business Times* (Singapore), September 3, 2008.

August 23, 2008

Discussions at the Nuclear Suppliers Group (NSG) meeting in Vienna on removing the ban on nuclear commerce with India have ended inconclusively. The NSG will meet again to discuss this issue on September 4.

— "India: Nuclear Talks End without Decision," *The New York Times*, August 23, 2008.

August 1, 2008

The Board of Governors of the International Atomic Energy Agency (IAEA) endorsed a nuclear safeguards agreement with India by consensus. The agreement will enter into force after India's statutory and constitutional requirements are completed. The agreement will also permit India to add more nuclear facilities to be placed under the IAEA safeguards framework. At present IAEA safeguards cover six Indian nuclear facilities through agreements between 1971 and 1994.

—International Atomic Energy Agency, August 1, 2008, www.iaea.org.

July 23, 2008

The Manmohan Singh-government won a vote of confidence in the Parliament which now allows it to proceed further in negotiating the nuclear agreement with the United States. The communist bloc in Parliament, which had backed the coalition government in Parliament for the last four years, had withdrawn support to the government, in protest against the nuclear agreement.

— Rama Lakshmi and Emily Wax, "India's Government Wins Parliament Confidence Vote," *The Washington Post*, July 23, 2008.

July 11, 2008

The chairman of the Indian Atomic Energy Commission, Anil Kakodkar, has said that the draft safeguards agreement with the International Atomic Energy Agency (IAEA) does not infringe on the India's strategic nuclear program.

— "Deal with IAEA Not to Affect India's Strategic Programme — Atomic Energy Chief," BBC Monitoring South Asia, July 11, 2008.

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June 2, 2008

India's nuclear power generation fell by 10 percent in the last fiscal year (April 2007-March 31, 2008) as compared to the previous year, according to Indian officials. This occurred mainly because of a shortage of uranium to fuel these reactors. It has also delayed the commissioning of two 220-MW reactors.

—Sunil Saraf, "Uranium Shortage Dented Output of India's Power Reactors Last Year," *NuclearFuel*, June 2, 2008.

June 1, 2008

The Australian government has said that it could consider removing the country's ban on uranium sales to India if the U.S.-India 123 agreement was finalized.

—Josh Gordon, "Labor Softens on Uranium Sales to India," *The Sun Herald* (Sydney), June 1, 2008.

May 28, 2009

A senior Canadian government official has said that India and Canada are on the verge of signing a civilian nuclear cooperation agreement and that the details of such an agreement are being worked out. Canadian international trade minister Stockwell Day said that, "We're very close to having an agreement with India related to the civilian use of nuclear energy for the purpose of helping them meet their energy needs."

— "Canada poised to ink nuke cooperation deal with India," *Thaindian News*, May 28, 2009, www.thaindian.com.

May 22, 2008

According to diplomatic sources in Beijing, the Chinese government may not oppose the Nuclear Suppliers Group from granting an exemption to India, although it has not yet made a firm decision on such a commitment. China joined the NSG in 2004.

—Mark Hibbs, "China Seen Likely Granting Request from US for NSG Exemption for India," *Nucleonics Week*, May 22, 2008.

April 19, 2008

Indian foreign secretary Shivshankar Menon has said that India would be willing to provide the base for a nuclear fuel bank, although it would take considerable time before this issue reached the discussion stage.

— "Foreign Secretary Says India Willing to Provide Home for Nuclear Fuel Bank," *BBC Monitoring South Asia*, April 19, 2008, Lexis-Nexis.

March 13, 2008

Members of the Nuclear Suppliers Group (NSGP) are in the process of drafting conditions that India has to meet before the NSG would consider granting an exemption in its rules. India has sought an exemption with no conditions, but the United States has more or less accepted that some conditions will be put forward.

—Mark Hibbs, "NSG Drafting Exemption Conditions Anticipating India-IAEA Agreement," *Nucleonics Week*, March 13, 2008.

March 10, 2008

Canadian government officials have said that they are willing to change the country's nonproliferation policy and consider being part of a consensus decision at the Nuclear Suppliers Group to allow India to participate in

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international nuclear commerce.

—Mark Hibbs, "Canada May Support NSG Exemption for India," *NuclearFuel*, March 10, 2008.

February 28, 2008

United States government officials have emphasized to their Indian counterparts the need for assurances that New Delhi will purchase some nuclear reactors from U.S. companies. This would allow the Bush administration to assure the U.S. Congress that the bilateral nuclear agreement between the two sides (which has to be approved by the Congress) will benefit U.S. companies.

—Daniel Horner, "US Seeking Indian Commitment to Buy Reactors from US Vendors," *Nucleonics Week*, February 28, 2009.

February 21, 2008

The Chairman of the Indian Atomic Energy Commission (AEC), Anil Kakodkar, has called for India to get a "clean exemption" from the Nuclear Suppliers Group (NSG), without any conditions, to allow it to participate in international civilian nuclear trade.

—"We Want Clean NSG Exemption — Kakodkar," *The Hindu*, February 21, 2008.

February 19, 2008

The Prime Minister's special envoy, Shyam Saran has expressed concern over the possibility of Pakistan's nuclear weapons falling into the hands of jihadi groups, who could then threaten to use or actually use such weapons.

—"India concerned over safety of Pakistan nuclear assets — official," Zee News, February 19, 2008, Lexis-Nexis.

February 12, 2008

According to the Indian government, private sector entities will not participate in the civilian nuclear sector till at least 2014. Private sector involvement requires modifications in the regulatory framework guiding the country's strategic nuclear program and changes in the Atomic Energy Act, steps that will take some years before completion.

—Sandeep Dikshit, "Nuclear power sector: no private players for now," *The Hindu*, February 12, 2008, www.hindu.com.

February 5, 2008

The Indian government is considering cooperative agreements with African countries to supply uranium fuel for India's civil nuclear program. These countries include Niger, Namibia, and Gabon, which are not members of the Nuclear Suppliers Group (NSG).

—Rajesh Ramachandran, "India to tap uranium-rich Africa for fuel," *The Asian Age*, February 5, 2008, Lexis-Nexis.

January 26, 2008

India and France signed a nuclear energy agreement that will allow New Delhi to acquire nuclear equipment and fuel. But this is subject to India getting approval from the International Atomic Energy Agency(IAEA) and the Nuclear Suppliers Group (NSG).

—Jeremy Page, "Sarkozy signs nuclear deal with India," *The Times*, January 26, 2008.

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January 17, 2008

Australia's new Labor Party government has stated that it may not stand in the way of other international suppliers exporting uranium to India, although Canberra itself has decided not to sell uranium to New Delhi.

— "Australia may not block uranium sales to India," *The Age* (Melbourne), January 17, 2008.

January 16, 2008

The new Labor Party government in Australia has informed New Delhi that it will not export uranium to India till New Delhi remains outside the Nuclear Nonproliferation Treaty.

— "Uranium sales to India are linked to treaty," *International Herald Tribune*, January 16, 2008.

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2007-2005**19 December 2007**

The Planning Commission has endorsed the nuclear agreement with the United States, saying that it would allow supply of additional fuel from external sources to increase the country's power generation capability. The commission has said that the impact of the agreement will be felt during the 12th Five Year Plan (2012-2017).

— "Indian plan panel says nuclear deal to remove restrictions on fuel supplies," BBC Monitoring South Asia, December 19, 2007, Lexis-Nexis.

9 December 2007

The Indian Parliament's committee on science and technology has asked the government to ensure that the country's indigenous nuclear program is not adversely affected by the civilian nuclear agreement with the United States. In its report to the Department of Atomic Energy, the committee said that the agreement should be negotiated while considering the national interest.

— "Panel Asks Indian Government to Ensure Indigenous Nuclear Programme Continues," BBC Monitoring South Asia, December 9, 2007, Lexis-Nexis.

30 November 2007

The Russian government assured India of a lifetime supply of fuel for two 1,000MW capacity reactors being constructed with Russian assistance in Koodankulam in the southern Indian state of Tamil Nadu, according to an Indian government official. The two light water facilities are expected to be operational in 2009.

—Sujay Mehdudia, "Lifetime fuel for two Koodankulam reactors," *The Hindu*, November 30, 2007.

22 November 2007

During a visit to Vienna, Indian Atomic Energy Commission Chairman Anil Kakodkar held discussions with IAEA Director General El Baradei regarding negotiations on a safeguards agreement with India. The India-specific safeguards agreement for its civilian nuclear plants is expected to be similar to the facility- specific and material-specific agreements India has with the Agency, official sources said.

— "India, IAEA Continue Talks on N-Safeguards," Sahara Samay, 22 November 2007, www.sahasasamay.com.

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2 November 2007

Analysts say time is running out for India and the United States to finalize their nuclear trade agreement, the *International Herald Tribune* reported Wednesday. Progress has stalled while the Singh administration attempts to overcome resistance from parties on both ends of the political spectrum to the deal. Critics say Washington would receive undue influence over Indian policies through the agreement, which would provide New Delhi with access to U.S. nuclear material and technology in exchange for allowing international monitoring of its civilian atomic complex.

— "Time Limited to Close India Deal, Experts Say" Global Security Newswire, 2 November 2007, www.nti.org.

19 October 2007

India and Pakistan began a daylong discussion today intended to further reduce the likelihood of an accidental nuclear conflict between the neighboring rivals, Agence France-Presse reported. The meeting continued a peace process begun by the nuclear-armed nations in January 2004, according to an Indian Foreign ministry statement. The sides were expected to review progress in implementing confidence-building measures as well as security matters involving the United Nations and other international institutions, the statement said.

— "India, Pakistan Open Nuclear Peace Talks," Global Security Newswire, 19 October 2007, www.nti.org.

18 October 2007

Echoing U.S. statements, Indian officials yesterday denied that a bilateral nuclear trade agreement has been mortally wounded by domestic opposition in New Delhi, Agence France-Presse reported. "The deal is not in cold storage and is very much in the offing," said ruling Congress party spokesman Shakeel Ahmed. "It is not correct to say that the deal has been put on hold or put on the back burner." The U.S. and Indian statements followed a Monday phone conversation in which Prime Minister Manmohan Singh told President George W. Bush that "certain difficulties" were preventing Singh from pressing the deal toward implementation.

— "Facing Trouble at Home, Indian Leaders Continue to Build International Support for Nuclear Deal," Global Security Newswire, 18 October 2007, www.nti.org.

5 September 2007

Indian leaders have created a 15-person commission to study the ramifications of a pending nuclear trade agreement with the United States, the Associated Press reported today. The panel's creation marks an effort by Prime Minister Manmohan Singh to keep control of his political leadership, which has been threatened by communist parties' opposition to the nuclear deal.

— "India Creates Panel to Study Nuclear Deal," Global Security Newswire, 5 September 2007, www.nti.org.

23 July 2007

The United States and India agreed to terms Friday for their nuclear trade deal, Agence France-Presse reported (see GSN, July 20). "The agreement has been finalized but it awaits review by both governments," said Rahul Chhabra, a spokesman for the Indian Embassy in Washington, said following high-level talks here last week on the implementation agreement for the deal. The talks were extended into Friday as officials made headway through disputes that had stalled the agreement over the past several months.

— "U.S., India Finalize Nuclear Deal," Global Security Newswire, 23 July 2007, www.nti.org.

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2 January 2007

India and Pakistan on Monday exchanged lists of nuclear installations and facilities. The exchange took place simultaneously through diplomatic channels at New Delhi and Islamabad. The exchange is mandated by the Agreement on the Prohibition of Attack against Nuclear Installations and Facilities.

— "Lists of nuclear facilities exchanged" *The Hindu*, 2 January 2007, www.hindu.com.

19 December 2006

President Bush signed legislation yesterday permitting civilian nuclear cooperation with India, reversing three decades of nonproliferation policy in the interest of redefining U.S. relations with the world's largest democracy and reshaping the geopolitical balance as China asserts itself in Asia. Bush, who has made the fight against the spread of nuclear weapons a centerpiece of his foreign policy, persuaded Congress to make an exception for India despite its not having signed the nuclear Non-Proliferation Treaty. Although critics warn that the deal could spark a regional arms race, Bush called it a landmark moment that finally relegates Cold War-era tensions to the past. "The United States and India are natural partners," Bush said at a signing ceremony in the East Room attended by lawmakers, diplomats and Indian Americans. "The rivalries that once kept our nations apart are no more - and today, America and India are united by deeply held values."

— "Bush Signs India Nuclear Law," *Washington Post*, 19 December 2006, www.washingtonpost.com.

19 November 2006

India on Sunday successfully test-fired a nuclear-capable missile with a range of up to 180 miles, a defense ministry official said. The Prithvi missile was fired into the Bay of Bengal from a test range in Chandipur in the eastern state of Orissa, the official said on condition of anonymity as he is not allowed to reveal his identity under ministry rules. India's Prithvi test comes three days after rival Pakistan carried out a similar test of its nuclear-capable Ghauri missile, also known as the Hatf 5.

— "India test-fires nuclear-capable missile" *USA Today*, 19 November 2006, www.usatoday.com.

15 November 2006

India and Pakistan agreed on measures to combat terrorism and prevent an accidental nuclear conflict in South Asia at the first peace talks since a terrorist attack on Mumbai's train network in July, Pakistan's foreign secretary said Wednesday. Blaming the attack — which killed more than 200 people — on militants based in Pakistan, and on Islamabad's intelligence service, India put the talks on hold. The key to resumption was a deal to create what was described as an "anti-terrorism mechanism" that could help the historic rivals work together to halt attacks like those in Mumbai. Pakistani Foreign Secretary Riaz Mohammed Khan told reporters that, at talks that began Tuesday, he and Indian Foreign Secretary Shiv Shanker Menon had agreed to set up a three-member commission to exchange information on terror threats. A foreign ministry official from each side is to work with the group, he said.

— "India and Pakistan agree on anti-terror, nuclear safety measures" *USA Today*, 15 November 2006, www.usatoday.com.

8 September 2006

India will not accept any U.S. move to cap its production of enriched uranium and plutonium, the country's top

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nuclear scientist said in an interview published Friday. "We will accept only a multilaterally negotiated nondiscriminatory and universally verifiable treaty (on fissile material production), negotiated at the Conference on Disarmament," The Hindu newspaper quoted Anil Kakodkar, chairman of the Atomic Energy Commission, as saying. India considers reprocessing of uranium and plutonium an extremely important part of full civil nuclear cooperation with the United States, Kakodkar said.

— "Report: India disproves capping of its nuclear fissile material production" *The International Herald Tribune*, 8 September 2006, www.ihf.com.

23 August 2006

India's prime minister said Wednesday the country would retain its right to carry out future nuclear tests despite a civilian nuclear deal with the United States, a news report said. "There is no scope for capping of our strategic (nuclear) program. It will be decided by the people, government and Parliament of the country and not by any outside power," Press Trust of India quoted Prime Minister Manmohan Singh as saying in a statement in Parliament.

— "India Said to Retain Right to Hold Tests" *The Washington Post*, 23 August 2006, www.washingtonpost.com.

2 March 2006

During a visit to India, U.S. President Bush and Indian Prime Minister Singh discussed the two nations' landmark agreement to share nuclear reactors, fuel, and expertise in return for India's acceptance of international safeguards. Eight months in the making, the accord would end India's long isolation as a nuclear maverick that defied world appeals and developed nuclear weapons. India agreed to separate its tightly entwined nuclear industry — declaring 14 reactors as commercial facilities and eight as military — and to open the civilian side to international inspections for the first time.

— "Nuclear deal announced as Bush visits India" *USA Today*, 2 March 2006, www.usatoday.com.

30 January 2006

India plans to abstain from a vote on Iran's nuclear program at an emergency meeting of the International Atomic Energy Agency later this week, senior Indian officials said Monday. The officials spoke as countries concerned with the Iranian nuclear crisis - three European countries, the United States, Russia and China - were preparing for crucial meetings in London. The board of the IAEA, the nuclear regulator of the United Nations, is scheduled to hold an emergency session in Vienna on Thursday to consider sending the nuclear issue to the Security Council, where sanctions against Iran would be considered.

— "India says it will abstain in Iran nuclear vote" *The International Herald Tribune*, 30 January 2006, www.ihf.com.

15 December 2005

India said it will not allow changes to a nuclear deal with the United States, to ensure its passage by the U.S. Congress. Prime Minister Manmohan Singh told parliament the landmark deal struck with U.S. President George W. Bush when he visited Washington in July, giving New Delhi access to civilian atomic technology, was a "binding commitment." The agreement would extend full U.S. civilian nuclear energy cooperation to New Delhi, denied access to nuclear technology since 1974 when it first tested a nuclear weapon and refused to sign the Nuclear

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Nonproliferation Treaty.

— "Indian PM says no changes to India-US nuclear deal" *Forbes*, 15 December 2005, www.forbes.com.

26 November 2005

India will be under "no compulsion" to separate its civil and nuclear facilities if it finds the process too complicated and expensive, official sources said here on Friday. "We don't have to go ahead with this," the sources said about India's commitments under the 18 July civilian nuclear deal with the United States. But in case India took the view that separation was not viable, the other "benefits" that were to flow to New Delhi as per the accord would not be available.

— "No compulsion for India to separate civil and nuclear facilities" *The Hindu*, 26 November 2005, www.hindu.com.

27 September 2005

Canada reversed itself on Monday and said it would supply material for India's atomic energy program, even though India has carried out nuclear tests in the past. Foreign Minister Pierre Pettigrew signed an agreement with his Indian counterpart, Natwar Singh, under which Canada will allow the supply of nuclear-related 'dual-use items', which can be used for civilian and military applications. The two countries also agreed to pursue further opportunities for the development of peaceful uses of nuclear energy, diplomatic phrasing that a Canadian official said could lead to the resumption of the supply of Canadian nuclear reactors to India. "We have to acknowledge the substantial progress that has been made in India," Pettigrew told a news conference. He was referring to several steps taken by Delhi, including a moratorium on nuclear testing and a commitment to separate its civilian and military nuclear programs.

— "Canada to help India's nuclear programme" *Dawn*, 27 September 2005, www.dawn.com.

14 September 2005

With pledges to elevate relations with India to a new level of friendship after decades of tensions, President George W. Bush signed an accord with Prime Minister Manmohan Singh in July promising cooperation on dozens of issues from military security to civilian nuclear power. But a new irritant has disrupted the push toward Indian-American friendship as the Bush administration has started pressing a reluctant India to join the West in confronting Iran over its suspected nuclear weapons program. India, with a longstanding friendship with Tehran, is demurring. "The Indians are emerging from their nonaligned status and becoming a global power, and they have to begin to think about their responsibilities," a senior administration official said. "It's a basic choice you make," he said, adding that the choice was whether to join Europe and the United States in seeking to stop Iran's pursuit of nuclear weapons or to join other countries in thwarting a referral of Iran's actions to the United Nations Security Council.

— Steven R. Weisman, "Friendship with Iran threatens India's ties to U.S." *The International Herald Tribune*, 14 September 2005.

5 August 2005

India and Pakistan have started a fresh round of talks aimed at building trust on military issues and avoiding an accidental nuclear war, officials said. The two sides hope to finalize an agreement to notify each other ahead of

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missile tests and upgrade an existing hotline to reduce risks of nuclear accidents, an Indian foreign ministry spokesman said. It is the third round of discussions in the so-called nuclear confidence building measures. Previous meetings, part of a peace process that began in January 2004, were also held in June and last December.

— "India, Pakistan resume talks on nuclear issues" *Forbes*. 5 August 2005, www.forbes.com.

24 July 2005

India is to press ahead with talks on a pipeline deal to deliver natural gas from Iran despite an agreement with the United States for the sale of civilian nuclear technology, reports said. Oil Minister Mani Shankar Aiyar, who this year secured cabinet approval for the pipeline first mooted in 1994, said the nuclear technology agreement with Washington is not a 'quid pro quo' for abandoning the Iran-Pakistan-India pipeline. "I don't think there's any connection between the two," said Aiyar, when asked if India had promised to scrap efforts to import natural gas from Iran in return for Washington providing nuclear technology and fuel for power generation, the Press Trust of India news agency reported.

— "India to continue Iran pipeline talks despite US nuclear energy deal — reports" *Forbes*, 24 July 2005, www.forbes.com.

10 May 2005

The government introduced a bill in parliament today that seeks to prevent nuclear proliferation and the transfer of missile technology to non-nuclear states, a statement said. Defense Minister Pranab Mukherjee introduced the Weapons of Mass Destruction and their Delivery Systems bill on the eve of the seventh anniversary of the tests India carried with a series of weapons, including a 45-megaton thermonuclear device. The bill, which becomes law if endorsed by parliament's two houses, will "provide an integrated legislative basis to India's commitment to prevent proliferation of weapons of mass destruction," Mukherjee said.

— "India govt moves to prevent nuclear proliferation, missile technology transfer" *Forbes* www.forbes.com.

7 March 2005

India's nuclear program crossed an important milestone on Sunday when the country's largest and the first 540 megawatt (MWE) nuclear pressurized heavy water reactor was commissioned at 12:42 pm at Tarapur, a nearly three-hour drive from Mumbai. It is the fourth unit at this atomic power station and the 15th one in the country.

— "India's largest nuclear reactor commissioned" *The Times of India* <http://timesofindia.indiatimes.com>.

18 February 2005

India and Pakistan plan to finalize an agreement establishing a formal system of advance notification of missile tests by summer 2005, according to Indian External Affairs Minister Natwar Singh. The agreement is one of several that Indian and Pakistani officials have been ordered to complete during a set of meetings scheduled to occur by July 2005, Singh said during a joint press conference in Islamabad with his Pakistani counterpart Khurshid Kasuri. The press conference was held following Singh's visit to Pakistan, the first by an Indian foreign minister since 1989, which also involved meetings with Pakistani President Gen. Pervez Musharraf and Prime Minister Shaukat Aziz.

— "India, Pakistan to Finalize Agreement on Missile Test Notification by July, Indian Official Says" Global Security Newswire, www.nti.org.

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2004

28 June 2004

India and Pakistan agree to continue with a sustained and serious dialogue. Both approve the nuclear confidence building measures recommended by the experts who met in New Delhi on 19th and 20th June of 2004.

—"India, Pakistan agree to continue with a sustained dialogue to find peaceful settlement on Kashmir," *Asia Pulse*, 28 June 2004; in Lexis-Nexis Academic Universe, 30 June 2004, <http://web.lexis-nexis.com>.

23 June 2004

India is allegedly negotiating the lease of two nuclear submarines with Russia. It is also making indigenous efforts to develop a miniaturized nuclear propulsion system to be installed in its submarines.

—"New Indian Naval Doctrine Says Nuclear Submarines 'Essential,'" PTI News Agency, New Delhi, 23 June 2004; in Lexis-Nexis Academic Universe, 23 June 2004, <http://web.lexis-nexis.com>.

22 June 2004

At a two-day conference on International Nonproliferation organized by the Carnegie Endowment for International Peace, Mohammad El Baradei, Director General of the International Atomic Energy Agency states that, "Any new adjustment to the (Nonproliferation Treaty) regime must include India, Pakistan and Israel at the negotiating table. Without their inclusion in and commitment to the broad nonproliferation and security reform, our efforts will fail."

—"Any Adjustment to NPT Must Include India, Pak, and Israel," Press Trust of India, 22 June 2004; in Lexis-Nexis Academic Universe, 22 June 2004, <http://web.lexis-nexis.com>.

20 June 2004

India and Pakistan decide to establish a hotline between their foreign secretaries as a confidence-building measure on nuclear issues, and in an effort to avert misunderstandings and reduce risks with regard to nuclear issues. Both countries also plan to continue bilateral discussions to work towards the implementation of the 1999 Lahore Memorandum of Understanding. They also decide to conclude an Agreement with technical parameters on pre-notification of flight testing missiles.

—"Indian Spokesperson Describes Foreign Secretary Nuclear Hotline," BBC Monitoring South Asia, 20 June 2004; in Lexis-Nexis Academic Universe, 20 June 2004, <http://web.lexis-nexis.com>.

18 June 2004

A six-member high-level Pakistani delegation arrives in India to discuss nuclear confidence-building measures. The two sides are expected to continue talks on the basis of the 1999 Memorandum of Understanding, according to which the two countries agreed to a unilateral moratorium on nuclear tests "unless either side, in exercise of its national sovereignty decides extraordinary events have jeopardized its supreme interests." During the upcoming talks, the two sides will engage in bilateral consultations on security, disarmament and nonproliferation issues.

—"Pak Delegation Arrives for Talks on Nuclear CBMs," Press Trust of India, 18 June 2004; in Lexis-Nexis Academic Universe, 18 June 2004, <http://web.lexis-nexis.com>.

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12 June 2004

A Dubai-based 35-year old Indian businessman, Akhtar Hussain Qutbuldin Ahmed, is deported from the United Arab Emirates (UAE) to Mumbai, India for allegedly trying to sell secrets related to India's nuclear program to diplomatic missions of a number of undisclosed countries. The arrest comes at the end of a two-year surveillance operation mounted by the UAE police. Intelligence agencies suspect that Akhtar likely procured secrets about India's nuclear program from his nuclear-scientist brother.

—"Indian businessman arrested in Dubai allegedly selling nuclear secrets deported," PTI, 12 June 2004; in Lexis-Nexis Academic Universe, 13 June 2004, <http://web.lexis-nexis.com>.

12 June 2004

"Berkeley Nucleonics Corporation" (BNC), an American company, is fined U.S.\$ 300,000 for exporting a nuclear component to the Bhaba Atomic Research Center in India. The company shipped a pulse generator, a device that emits bursts of electricity and is used for calibrating radar or nuclear instruments and sometimes used in military applications. BNC was indicted in August 2001 on one count of conspiracy and six counts of violating export administration regulations.

—"US Company Fined for Selling Nuclear Tech Components to India," Press Trust of India, 12 June 2004; in Lexis-Nexis Academic Universe, 13 June 2004, <http://web.lexis-nexis.com>.

10 June 2004

India expects to give priority to nuclear confidence-building measures in its upcoming talks with Pakistan. In a statement to BBC World's Hardtalk program Indian Foreign Minister Natwar Singh says, "To me personally, the most important thing on our agenda should be the nuclear dimension because when we (Congress) remitted office in 1996, we (India) were not a nuclear power."

—"Priority Given to Nuclear CBMs in Talks, Says India," *The Nation*, 10 June 2004; in Lexis-Nexis Academic Universe, 16 November 2004, <http://web.lexis-nexis.com>.

8 June 2004

U.S. State Department Director of Policy Planning Mitchell B. Reiss urges India to place its nuclear facilities under International Atomic Energy Agency (IAEA) safeguards. Referring to India and Pakistan, Reiss adds, "We have urged both parties to maintain their nuclear moratoria, to refrain from assembling or deploying nuclear weapons, and to bring an early end to the production of fissile materials so as to avoid a costly and destabilizing arms race."

—"India Asked to Place Nuclear Facilities under IAEA Safeguards," Press Trust of India, 6 June 2004; in Lexis-Nexis Academic Universe, 8 June 2004, <http://web.lexis-nexis.com>.

5 June 2004

The director of the Kudankulam nuclear power project says that the participation of Russian specialists in the construction of the plant "guarantees high-quality of work." Approximately 300 Russian contractors are currently actively engaged in the project.

—"India: Russian help guarantees "high quality" work in nuclear power plant," BBC Monitoring, 6 June 2004; in Lexis-Nexis Academic Universe, 6 June 2004, <http://web.lexis-nexis.com>.

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2 June 2004

Indian Foreign Minister Natwar Singh calls on China and Pakistan to adopt a "common nuclear doctrine." While China refrains from any comment, Pakistani Foreign Ministry spokesperson Masood Khan states that it "looks like a new and innovative proposal which needs further and deeper examination."

—"India Sets Dovish Tone with Pakistan, China in Call for Nuclear Coordination," Agence France Presse, 2 June 2004; in Lexis-Nexis Academic Universe, 3 June 2004, <http://web.lexis-nexis.com>.

29 May 2004

Pakistani Prime Minister Zafarullah Jamali calls Indian Prime Minister Manmohan Singh to reiterate his government's resolve to bring peace between the two countries and resume dialogue. Singh responds positively to Jamali's overture. Expert-level dialogue between the two countries is scheduled for May 25-26 but was stalled due to change of the Indian government.

—"Pakistan Reiterates Resolve to Make Peace with India," Xinhua News Service, 30 May 2004; in Lexis-Nexis Academic Universe, 30 May 2004, www.lexis-nexis.com.

30 April 2004

Dr. Baldev Raj is appointed director of Indira Gandhi Center for Atomic Research, Kalpakkam. He replaces retiring director S.B. Boje.

—"New director of Indian atomic research center appointed," Global News wire: BBC Monitoring/BBC," 30 April 2004; in Lexis-Nexis Academic Universe, 30 April 2004, <http://web.lexis-nexis.com>.

22 April 2004

U.S. President George W. Bush claims that U.S. and British shuttle diplomacy prevented India and Pakistan from going to war with one another. "2001 was the year that we had shuttle diplomacy to convince Pakistan and India not to go to war with each other," says Bush. He adds, "...Powell went, and then Straw went from Britain, and then Armitage went, and then whoever his equivalent is from Britain went, with the idea of talking everybody down."

—Anwar Iqbal, "Bush: We Prevented India, Pakistan War," United Press International, 22 April 2004; in Lexis-Nexis Academic Universe, 23 April 2004, <http://web.lexis-nexis.com>.

21 April 2004

India accepts Pakistan's proposal to conduct talks on nuclear confidence building measures. The negotiations are expected to take place in Islamabad on May 25-26.

—"Nuclear CMBS: India Agrees on Holding Talks with Pakistan," Frontier Star, 21 April 2004; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>, 21 April 2005.

13 April 2004

India reiterates that it has no intentions to sign the 'Additional Protocol' to the safeguards agreements already signed with the International Atomic Energy Agency. Addressing the 40th Munich Conference on Security, India's National Security Advisor Brajesh Mishra states, "There is a wider question of multilateral approaches to the security issues of today. Approaches to security based on conventional alliances, arms competition, deterrence and diplomacy have been less effective in coping with the challenges posed by terrorism, suicide attacks, weapons

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of mass destruction (WMD) and failing states. Asia, both as source and destination, has witnessed the proliferation of WMD. Extraordinary measures are being contemplated to guarantee security from these challenges. A multilateral consultative machinery with international credibility can provide legitimacy to such measures. But for it to be effective, it has to be evolved with wide and representative consultations. I would also add that clubbing partners against proliferation with countries of true proliferation is a self-defeating approach, which can only weaken the cause of genuine nonproliferation."

—Amit Baruah, "India Not to Sign NPT-Related Additional Protocol," *The Hindu*, 13 April 2004; in Lexis-Nexis Academic Universe, 13 April 2004, <http://web.lexis-nexis.com>.

8 April 2004

In a joint statement, India and Russia condemn terrorism and agree to deepen their counter-terrorism cooperation, including the threat of proliferation of weapons of mass destruction posed by terrorist organizations. Both sides agree to continue consultations on the 'Comprehensive Convention Against Acts of Nuclear Terrorism'.

—"India, Russia Agree to Deepen Anti-Terror Cooperation," BBC Worldwide Monitoring, 8 April 2004; in Lexis-Nexis Academic Universe, 9 April 2004, <http://web.lexis-nexis.com>.

31 March 2004

In his testimony before the House International Relations Committee, Undersecretary of State for Arms Control and International Security John Bolton states that "as part of expanded cooperation, India will undertake meaningful steps to improve its export controls systems, and work with the U.S. in pursuit of shared nonproliferation goals." However, "consistent with its obligations under U.S. law and constitutional commitments, the United States is offering no assistance to India's nuclear weapons or missile programs."

—"India to Undertake "Meaningful Steps" Under NPT Goals," Press Trust of India, 31 March 2004; in Lexis-Nexis Academic Universe, 31 March 2004, <http://web.lexis-nexis.com>.

28 March 2004

The former Chairman of India's Atomic Energy Commission M.R. Srinivasan conjectures that with other powers moving away from nuclear-based power production systems, India could emerge as a nuclear-power production center. India has developed the capability to deliver economically priced nuclear power and 13 nuclear reactors currently function at 90% of their capacity. India also has very large reserves of thorium. Srinivasan says that for some reason the Indian government embarked on a nuclear holiday during the period 1990-1997. However, India's Nuclear Power Corporation is now working on commissioning 700MW reactors, an endeavor that would place India among the leading nations in the use of heavy water reactor technology.

—"India Can Become a Nuclear-Power Production Centre," *The Hindu*, 28 March 2004; in Lexis-Nexis Academic Universe, 28 March 2004, <http://web.lexis-nexis.com>.

18 March 2004

U.S. Secretary of State Colin Powell indicates that the United States would like India to join the U.S.-led Proliferation Security Initiative (PSI), which aims at interdicting proliferation trade on the high seas. "We would like to see India participate in the PSI...we decided that we would have our staffs engage on this with respect to understanding the interdiction principles associated with PSI and how India might contribute to it. So we are going

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to increase the dialogue with respect to possible Indian participation," says Powell. India's External Affairs Minister Yashwant Sinha also tells reporters that officials from both countries will engage in negotiations "with a view to finding out how India could engage in this full process."

—Siddharth Varadarajan, "US for India hand in proliferation initiative," *Times of India*, 18 March 2004; in Lexis-Nexis Academic Universe, 17 March 2004, <http://web.lexis-nexis.com>.

16 March 2004

After his meeting with India's External Affairs Minister Yashwant Sinha in New Delhi, U.S. Secretary of State Colin Powell tells reporters that he will query Pakistani President Pervez Musharraf whether Pakistani officials were complicit in aiding the Dr. A.Q. Khan in proliferating nuclear weapons technologies to Iran, Libya, and North Korea. The question is "who else was involved in that network, was involved within past Pakistani governments or anything that might be taking place of a continuing nature," says Powell. He also adds, "...we can't be satisfied until this entire network is gone, branch and root."

—George Gedda, "Powell, in India, says Pakistan's nuclear smuggling must stop," Associated Press, 16 March 2004; in Lexis-Nexis Academic Universe, 17 March 2004, <http://web.lexis-nexis.com>.

16 March 2004

Indian officials indicate that the Indian government will raise the issue of proliferation from Pakistan during U.S. Secretary of State Colin Powell's forthcoming visit to New Delhi. In this regard, India will seek assurances that such proliferation activities have ended and will not be repeated in the future. On the issue of export controls, the officials suggest that New Delhi is cognizant of U.S. concerns about Indian export controls; but that India is addressing the issue out of its own concerns. With regard to the U.S. Proliferation Security Initiative, the officials claim that India has neither asked nor been approached by the United States to join the initiative.

—"India to raise n-proliferation, outsourcing issues with Powell," *Hindu*, 16 March 2004; in Lexis-Nexis Academic Universe, 16 March 2004, <http://web.lexis-nexis.com>.

12 March 2004

Indian External Affairs Minister Yashwant Sinha in Delhi and his Pakistani Foreign Minister Khrushid Kasuri Islamabad appeal for their countries to be fully accepted as nuclear powers. Both ministers call for changes in the Non-Proliferation Treaty to accept India and Pakistan as nuclear weapons states. Sinha says "nuclear weapons are sadly the ultimate guarantor of a nation's security."

—"India, Pakistan Each Call for Recognition as Nuclear Powers," Agency France Presse, 12 March 2004; in Lexis-Nexis Academic Universe, 13 March 2004, <http://web.lexis-nexis.com>.

12 March 2004

In an address before the 'India Today Conclave 2004' India's External Affairs Minister Yashwant Sinha declares that India is a "mature" nuclear power and takes the responsibilities stemming from that capability "very seriously." "It was the imposition of an imperfect nonproliferation order, evidence of which is all around us, that compelled us to make the transition from nuclear abstinence to that of a reluctant nuclear power," says Sinha. He adds, "...in a world where weapons of mass destruction are still to be eliminated, nuclear weapons sadly remain the ultimate guarantor of a nation's security." Sinha reiterates India's commitment to a complete and universal elimination of

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nuclear weapons and expresses willingness to enter into negotiations for a fissile material cut-off treaty. He also insists that although India is not a member of the nuclear nonproliferation treaty, "...we [India] believe in and uphold the broader nonproliferation goals of the treaty, for its frailties and drawbacks affect us as well."

—"India - A "Mature" Nuclear Power, Says Foreign Minister," Press Trust of India, 12 March 2004; in Lexis-Nexis Academic Universe, 12 March 2004, <http://web.lexis-nexis.com>.

7 March 2004

At the India-Brazil-South Africa (IBSA) Trilateral Commission Meeting, the three countries express their dissatisfaction with the "serious inadequacies" in the "implementation of and compliance with" nonproliferation and disarmament by NPT member States such as Iran and Libya. Indian External Affairs Minister Yashwant Sinha states that IBSA would "intensify their cooperation at the IAEA and other forums to ensure unimpeded growth and development of peaceful use of atomic energy under appropriate safeguards."

—Siddharth Varadarajan, "India, Brazil, S. Africa Bloc Forges Ahead," *Economic Times*, 7 March 2004; in Lexis-Nexis Academic Universe, 8 March 2004, <http://web.lexis-nexis.com>.

4 March 2004

Russia and India express mutual satisfaction at the pace of construction of the Kudankulam nuclear power plant, which is expected to be completed in 2007. India is interested in having Russia construct two more power plants. Russian Deputy Atomic Energy Minister, Vladimir Asmolov, says that India should be more active in its discussions with the International Atomic Energy Agency.

—"Indian-Russian Nuclear Project on Schedule - Official," BBC Monitoring Reports, 4 March 2004; in Lexis-Nexis Academic Universe, 4 March 2004, <http://web.lexis-nexis.com>.

1 March 2004

In light of A.Q. Khan's illicit transfer of nuclear technology to Iran, Libya, and North Korea, the Chairman of India's Atomic Energy Commission says that is unlikely that such transfers could happen from India. Kakodkar says, "our installations are very secure." In view of the rising concerns about terrorism, Kakodkar adds, "there is a scare about terrorism, but there need be no fear on that count here."

—Ramola Talwar Badam, "India's Nuclear Chief Says the Country's Atomic Facilities are Safe from Terrorists," Associated Press, 1 March 2004; in Lexis-Nexis Academic Universe, 2 March 2004, <http://web.lexis-nexis.com>.

29 February 2004

At a meeting in New Delhi, Secretary of the Iranian Supreme National Security Council, Hasan Rohani attempts to garner Indian support for Iran in the upcoming board meeting of the International Atomic Energy Agency (IAEA) in Vienna. India is on the 35 member IAEA board and has assured Tehran that it will advocate fresh engagements with Iran rather than the imposition of fresh strictures against it.

—"India's Sinha Meets Iran's Khatami, Kharzai," *The Telegraph*, Kolkata, 29 February 2004; in Lexis-Nexis Academic Universe, 29 February 2004, [www.lexis-nexis.com](http://web.lexis-nexis.com).

27 February 2004

The chairman of the U.S. Nuclear Regulatory Commission praises India for the safety measures at its nuclear power

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plants. "What we have observed is that Indian power plants have made remarkable improvements in power capacity," says Richard A. Meserve.

—Beth Duff-Brown, "American scientists praise India's safety regulations," Associated Press, 27 February 2004; in Lexis-Nexis Academic Universe, 28 February 2004, <http://web.lexis-nexis.com>.

24 February 2004

Indian Finance Minister Jaswant Singh says that India's record of safety and security of its nuclear program is better than that of several advanced countries. Singh states, "It is internationally recognized that management of our nuclear programme and its safety and security are much better than all or several of the so called P-5 countries."

—"India's Nuke Safety Record Better than Many Advanced Countries," Press Trust of India, 24 February 2004; in Lexis-Nexis Academic Universe, 25 February 2004, www.lexis-nexis.com.

23 February 2004

In response to illicit sales of Pakistani nuclear technology to Iran, Libya, and North Korea, Indian Prime Minister Atal Behari Vajpayee states, "On the one side, nonproliferation talks are going on. On the other, clandestinely transfer of nuclear technology to other countries has taken place. We have taken serious note of it. We are taking all steps necessary to safeguard the country's security." He adds, "We are confident that under the UN supervision, a system will be successfully evolved to ensure that there is no room for such proliferation."

—"India Has Taken Note of Export of Nuke Tech from Pak: Vajpayee," *Frontier Star*, 23 February 2004; in Lexis-Nexis Academic Universe, 20 May 19, 2004, www.lexis-nexis.com.

22 February 2004

U.S. court records show that South African businessman Asher Karni, who worked as a middleman in the nuclear black market, tried to procure dual-use goods and items for both India and Pakistan. Karni exchanged e-mails with Raghavendra 'Ragu' Rao of the Bangalore-based Foretek Marketing (Pvt.) Ltd. Rao allegedly tried to procure accelerometers for the Liquid Propulsion Systems Center and the Vikram Sarabhai Space Center and asked Karni to conceal the identity of the final customer as exports of accelerometers are restricted due to their potential uses in the guidance systems of missiles.

—"Bangalore firm drawn into n-web," *Times of India*, 22 February 2004; in Lexis-Nexis Academic Universe, 22 February 2004, <http://web.lexis-nexis.com>.

22 February 2004

Indian officials reject U.S. insinuations that India might be a problem proliferation case. Citing the employment of the retired Indian nuclear scientist Y.S.R. Prasad by the Iranian government, the officials suggest that Prasad is an expert in nuclear power engineering and worked on Iran's Bushehr nuclear power project which is under International Atomic Energy Agency safeguards.

—Manoj Joshi, "Indo-Iran ties may hurt good friend US," *Times of India*, 22 February 2004; in Lexis-Nexis Academic Universe, 22 February 2004, <http://web.lexis-nexis.com>.

18 February 2004

A study undertaken the Washington DC-based Stimson Center predicts that a five kiloton nuclear explosion in the

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Indian city of Mumbai could cause approximately 95,000 initial casualties that could ultimately increase to 800,000. In addition, an attack by a radiological dispersion device on the Pakistani city of Karachi would be a national catastrophe. In this regard, a few grams of Cesium-137 would be sufficient to halt Pakistan's economic growth. "The area contaminated by a dirty bomb attack would be very expansive. Even the equivalent of two paper-clips worth of certain radioactive substances could, if used effectively, impair the heart of major cities for many years, with immense psychological and economic impacts," the study says. The Stimson Center recommends that both India and Pakistan establish nuclear risk reduction centers that could serve as focal points for notifications and communications regardless of India and Pakistan's state of bilateral relations.

—"India and Pakistan should urgently shake up nuclear CBMs: Study," Press Trust of India, 18 February 2004; in Lexis-Nexis Academic Universe, 18 February 2004, <http://web.lexis-nexis.com>.

17 February 2004

Pakistani officials disclose that Pakistan has asked India to negotiate an agreement to lower the threat of a nuclear or conventional war, and to scale back the arms race between the two countries. A Pakistani foreign ministry official says the peace proposal calls for both countries to "negotiate the threshold for minimum deterrence...there should not be an open-ended arms race for strategic or conventional arms. It also aims to limit the risk of a nuclear conflict and a missile race."

—"Pakistan Proposes Nuclear and Conventional Pact with India," Pakistan Press International Services, 17 February 2004; in Lexis-Nexis Academic Universe, 19 February 2004, <http://web.lexis-nexis.com>.

17 February 2004

In his inaugural address to the 'International Conclave on Buddhism and Spiritual Tourism' Indian President Abdul Kalam says, "If every nation possessing nuclear weapons decides to dismantle completely, we will be the first to do so." He further states, "At no time, we will use them, unless someone uses against us."

—"Indian Missile Man Speaks of Scrapping Nukes," Pakistan Press International Information Services, 17 February 2004; in Lexis-Nexis Academic Universe, 19 February 2004, <http://web.lexis-nexis.com>.

17 February 2004

Indian External Affairs Minister Yashwant Sinha rejects the European Union's help in resolving differences between India and Pakistan stating that while India is grateful for such offers, the issues are best solved bilaterally. Sinha adds that it will not be difficult for India and Pakistan to reach an agreement on the time-frame, detailed agenda and the level of talks.

—Amit Baruah, "India, Pakistan Can Reach Accord, Says Sinha," *The Hindu*, 17 February 2004; in Lexis-Nexis Academic Universe, 17 February 2004, <http://web.lexis-nexis.com>.

15 February 2004

In the light of revelations concerning Pakistani nuclear scientist Dr. A.Q. Khan's proliferation activities, the Indian government is investigating allegations that retired Indian scientists are working in the employ of the Libyan government. Many of these scientists are believed to be former Indian Space & Research Organization staffers who were lured to Libya by the prospects of monetary gains. India's Ambassador to Libya Dinkar Srivastava says that many of them were possibly involved in "high technology programs." The Libyan government apparently kept

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their passports upon arrival and then whisked them away to secret facilities. Although Libya has assured the Indian government that all the projects in question were civilian projects, the Indian government is considering instituting a system of a personal bond from each employee that would prevent him or her from seeking employment for five years after retirement.

—"India Mulls Restrictions on Scientists Over Alarm at Libya Links," Agence France Presse, 15 February 2004; in Lexis-Nexis Academic Universe, 15 February 2004, <http://web.lexis-nexis.com>.

13 February 2004

India reacts cautiously to President Bush proposals aimed at eliminating the clandestine trade in weapons of mass destruction and their related technologies. Bush's proposals, spelt out in a speech at the National Defense University, include the Proliferation Security Initiative (PSI), which envisages the aggressive interdiction of suspect WMD cargoes on the high-seas and in the air. The Bush administration also hopes to block the sale of nuclear fuel enrichment and reprocessing technologies to countries that currently do not possess them as well as ban the sale of civilian nuclear equipment to countries which have not signed the 'Additional Protocol' with the International Atomic Energy Agency (IAEA). Commenting on Bush's proposals, an Indian official says, "we would like to make sure that we are not in any way a target for a tightened trading regime, that no ships bound for Indian ports are stopped...in other words, we have to be sure that India is part of the enforcers, not the enforced." Indian officials are also reluctant to sign the Additional Protocol as this would require India to open up its nuclear weapons facilities to IAEA inspection.

—"India lukewarm to Bush's nuke plans," *Economic Times*, 13 February 2004; in Lexis-Nexis Academic Universe, 13 February 2004, <http://web.lexis-nexis.com>.

13 February 2004

Without directly naming Pakistan, India's Chief of Army Staff Gen. N. C. Vij says that a scientist cannot sell nuclear technology without the knowledge of the state and that efforts should be made to control the dangers posed by proliferation.

—"Efforts Should be Made to Control Nuke Proliferation: Indian Army Chief," Global News Bites, 13 February 2004; in Lexis-Nexis Academic Universe, 19 May 2004, <http://web.lexis-nexis.com>.

12 February 2004

India's External Affairs Minister Yashwant Sinha says that the sale of nuclear technology by A. Q. Khan is a matter of concern to the world and efforts should be made to control proliferation. He also calls India a responsible nuclear power.

—"Proliferation of Nukes by A Q Khan Matter of Concern: Sinha," Press Trust of India, 12 February 2004; in Lexis-Nexis Academic Universe, 12 February 2004, <http://web.lexis-nexis.com>.

11 February 2004

India states that it was aware of illegal nuclear proliferation by Pakistan well before such activities were reported in the media. Indian Defense Minister George Fernandes calls on Pakistan to adopt more responsible behavior regarding nuclear proliferation in the future.

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—"India was Aware of Pakistani Nuclear Proliferation: Defense Minister," Agence France Presse, 11 February 2004; in Lexis-Nexis Academic Universe, 12 February 2004, <http://web.lexis-nexis.com>.

11 February 2004

India is building an undisclosed number of nuclear shelters for Prime Minister Atal Behari Vajpayee, President A.P.J. Abdul Kalam, top army commanders and other select officials. Most bunkers will be located in Delhi, Kashmir, Punjab, and Rajasthan and will include individual units of 30 sleeping bunks, their own power and water supplies, waste disposal, fire-fighting systems and decontamination modules. The shelters will provide safety in the event of a nuclear, chemical, or biological attack.

—S.N.M. Abdi, "Taking No Chances, India Builds War Bunkers," *South China Morning Post*, 11 February 2004; in Lexis-Nexis Academic Universe, 11 February 2004, <http://web.lexis-nexis.com>.

9 February 2004

Indian Foreign Minister Yashwant Sinha says that Pakistan should not be singled out as a nuclear proliferator. "There are so many countries whose scientists have spread nuclear weapons knowledge and the international community must act to end the black market...I would like to say what it clearly demonstrates is that there is a flourishing black market in nuclear technology. It is not Pakistan alone which needs to be blamed for this...something will have to be done to stop this black market, especially now because the entire international community is threatened with a danger of nuclear weapons falling into the hands of terrorists," says Sinha.

—"India Says Pakistan Not the Only Nuclear Proliferator," Global News Bites, Frontier Star, 9 February 2004; in Lexis-Nexis Academic Universe, 19 May 2004, <http://web.lexis-nexis.com>.

9 February 2004

At a meeting in Munich, Indian National Security Adviser Brajesh Mishra and Pakistani Foreign Minister Khurshid Mahmud Kasuri pledge to stop the spread of weapons of mass destruction. Both reiterate that neither India nor Pakistan will join the nonproliferation treaty, but will work alongside the international community to prevent proliferation.

—"Pakistan, India Not to Sign Non-Proliferation Treaty," BBC Monitoring International Reports, 9 February 2004; in Lexis-Nexis Academic Universe, 9 February 2004, <http://web.lexis-nexis.com>.

8 February 2004

Allegations surface that the Indian nuclear scientist Dr. Y.S.R. Prasad, who retired as the Chairman of India's Nuclear Power Corporation in the year 2000, served in the employ of the Iranian government. Prasad allegedly visited Iran on several occasions without obtaining clearances from the Indian government. The Iranian government apparently forwarded details concerning Dr. Prasad's employment to the International Atomic Energy Agency (IAEA) and the IAEA in turn requested the Indian government to debrief Dr. Prasad.

—"Indian scientist also involved in nuclear proliferation to Iran," *Frontier Star*, 8 February 2004; in Lexis-Nexis Academic Universe, 19 May 2004, <http://web.lexis-nexis.com>.

8 February 2004

A survey of attitudes among Indian army personnel conducted for the news media organization *Tehelka* by the

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Center for the Study of Developing Societies shows that Indian soldiers are concerned about the prospects of a nuclear war. The survey of the 1,595 soldiers polled across the major five commands in India also shows that over 80 percent of the soldiers are confident that India will defeat Pakistan in the event of a war and that the country is well prepared to fight a nuclear war.

—"Indian soldiers concerned about nuclear war: survey," Xinhua General News Service, 8 February 2004; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>, 9 February 2004.

8 February 2004

Indian Defense Minister George Fernandes says that India will have a dedicated military satellite for its armed forces soon. "Considering the vastness of our country and security environment around the country and beyond, there is an inescapable need to enhance our satellite surveillance capability," says Fernandes. In addition to boosting its surveillance capabilities, India's other defense priorities include the acquisition of medium-range combat aircraft, air defense systems, command, control and communications, computers, intelligence and reconnaissance systems. India has expressed interest in acquiring advanced U.S. sensor technologies, especially in the areas of photo and radar imagery.

—"India to have dedicated military satellite for armed forces - Fernandes," Global News Wire, 8 February 2004; in Lexis-Nexis Academic Universe, 10 February 2004, <http://web.lexis-nexis.com>.

6 February 2004

Commenting on the pardoning of the Pakistani nuclear scientist Dr. A.Q. Khan by the Pakistani government, Indian External Minister Yashwant Sinha states that Pakistan's recent nuclear proliferation is not a matter of internal concern, but a matter of serious concern to the entire community, and asks for the matter to be debated by the International Atomic Energy Agency.

—"India Says Pakistan Nuclear Proliferation Not an Internal Matter," BBC Monitoring International Reports, 6 February 2004; in Lexis-Nexis Academic Universe, 6 February 2004, <http://web.lexis-nexis.com>.

21 January 2004

India's External Affairs Minister Yashwant Sinha meets U.S. President George Bush at the White House and says that India and the United States have "agreed to engage each other very soon on the next steps which are needed to start quickly implementing Phase I of the agreement" on cooperation in the areas of civilian nuclear, space, and high-technology. U.S. Secretary of State Colin Powell seconds Sinha's statement and adds, "I am confident that we will be moving in an aggressive way and promptly."

—"India, US to Hold Talks on Nuclear, Space Initiatives, Missile Defence," BBC Monitoring International Reports, 21 January 2004; in Lexis-Nexis Academic Universe, 21 January 2004, <http://web.lexis-nexis.com>.

14 January 2004

Indian Prime Minister Atal Behari Vajpayee says that the U.S. President George W. Bush's decision to cooperate with India in civilian nuclear programs, civilian space and high technology areas is indicative of the international community's trust in India as a responsible nuclear power. The prime minister says the joint Indo-U.S. statement is for using atomic energy for peaceful purposes and to better society, and adds "it is good that he (Bush) has trust on us... the entire world knows that India will not use nuclear arms for the destruction of mankind".

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—"Indian Premier Says US Nuclear Cooperation a Manifestation of Trust," BBC Monitoring International Reports, 14 January 2004; in Lexis-Nexis Academic Universe, 14 January 2004, <http://web.lexis-nexis.com>.

14 January 2004

A U.S. official says that the "Next Steps in Strategic Partnership with India" that was recently announced by President George Bush will be implemented in a phased manner. "We will offer India expanded cooperation as India takes concrete steps to address our concerns, especially in the export control area. We also emphasize that we are not asking here for any changes in U.S. domestic law or our international obligations," explains the official. The official also insists that the initiative "...is not about diminishing in any way our concerns about India's nuclear weapons or domestic missile programs. We have not said anything to support India's nuclear weapons or domestic missile programs." When asked whether the United States considered India's export controls insufficient, the official says, "...one thing we have had to do over the years is to sanction Indian companies that have taken high technology goods and exported them to Iraq, for example, to the previous regime."

—Sridhar Krishnaswami, "U.S. Wants India to Address Concerns on Export Control," *The Hindu*, 14 January 2004; in Lexis-Nexis Academic Universe, 14 January 2004, <http://web.lexis-nexis.com>.

1 January 2004

India and Pakistan exchange upgraded lists of nuclear facilities and installations under a bilateral agreement for the 13th year in succession. The list mainly covers nuclear power and research installations in both countries.

—"India, Pakistan Conduct Annual Exchange of Nuclear Facility Lists," BBC Monitoring International Reports, 1 January 2004; in Lexis-Nexis Academic Universe, 1 January 2004, <http://web.lexis-nexis.com>.

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2003

15 December 2003

India is negotiating the export of 30-tons of heavy water to China. The heavy water will be used in China's pressurized heavy water reactors. India's Atomic Energy Commission Chairman Dr. Anil Kakodkar explains, the heavy water exported will involve end-user certification so that it is only used for the purposes for which it was purchased. However Kakodkar cautions, "DAE [Department of Atomic Energy] is still in the process of negotiations and the contract is yet to be signed."

—"China is set to import heavy water from India," *Asia Pulse*, 15 December 2003; in Lexis-Nexis Academic Universe, 16 December 2003, <http://web.lexis-nexis.com>.

11 December 2003

Israel's Defense Ministry declines to comment on reports in the *Hindu* and *Jerusalem Post* that Israel will cooperate with India in the development of the latter's nuclear submarine or Advanced Technology Vessel. An Indian defense delegation visited Israel in November to discuss areas of cooperation. Israeli Defense Ministry spokesperson Rachel Niedak-Ashkenazi says that the "Ministry of Defense does not divulge information regarding its connections with foreign countries." Similarly the Indian embassy in Tel Aviv declines to comment on the issue and states, "As a

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matter of policy, we don't make any comments on any individual defense deals,"

—Arieh O'Sullivan, "Israel offers to help India with nuclear sub project," *Jerusalem Post*, 11 December 2003; in Lexis-Nexis Academic Universe, 12 December 2003, <http://web.lexis-nexis.com>.

7 December 2003

The Nuclear Power Corporation of India Ltd. (NPCIL) is considering the feasibility of adding four more 1,000 MW nuclear power reactors at Koodankulam in addition to the two 1,000 MW reactors already under construction with Russian assistance. In addition, the NPCIL is also considering the feasibility of building an additional six 1,000 MW nuclear power reactors with French assistance. NPCIL's goal is to add 800 MW of nuclear power annually so that India can generate 10,000 MW of nuclear power annually by 2011.

—"Koodankulam to have 4 more reactors," Global News Wire, 7 December 2003; in Lexis-Nexis Academic Universe, 10 December 2003, <http://web.lexis-nexis.com>.

7 December 2003

India's federal government is reportedly drawing plans to train paramilitary forces such as the Indo-Tibetan border police and the Central Industrial Security Force to deal with nuclear, chemical, and biological disasters. Training courses will begin in January 2004. The first course will be for trainers who in turn will impart training to their peers. Experts from the United States will be involved in teaching the first "trainer's courses."

—"India to train paramilitary forces to deal with nuclear, chemical disaster," BBC, 7 December 2003; in Lexis-Nexis Academic Universe, 7 December 2003, <http://web.lexis-nexis.com>.

27 November 2003

The British government's Chief Scientific Advisor David Anthony King says that India could participate as a junior partner in the \$18.7 billion international fusion energy research (ITER) project that aims to build a fusion reactor by the middle of the 21st century. King says that China, the United States, South Korea, Russia, the European Union, Canada and Japan are already on board. The design of the research reactor is ready and four construction sites for building the reactor are under consideration. India could participate by contributing in a \$500 million project that involved materials research for the fusion program.

—"India can help implement reactor project," *Hindu*, 27 November 2003; in Lexis-Nexis Academic Universe, 26 November 2003, <http://web.lexis-nexis.com>.

13 November 2003

Russia's Deputy Atomic Minister Vladimir Asmolov states at a conference on 'Small-Scale Power Generating Industry-2003' in Obninsk that Russia discussed the subject of a low-capacity atomic heat and power plants based on a floating power plant with Indian National Security Advisor Brajesh Mishra, during the latter's recent visit to Moscow. The Indian government expressed interest in the project and export of the plant is now being considered to India, Indonesia, South Korea, China and other countries suffering from shortage of drinking water. One such 77 MW floating unit can generate sufficient electricity and thermal energy to support a town of 50,000 people or provide enough fresh water for one million people. The barge-mounted reactor could be towed to any point along India's coast line. However, the cost of generating power from a single \$150 million unit would be twice as expensive in comparison to land reactors. Russian scientists have built a prototype of a floating nuclear reactor for

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water purification and are planning to build a full-fledged floating nuclear power plant by the end of 2008 for use in Russia's northern areas. In this context, Russian Atomic Energy Minister Romyantsev comments that if Russia supplies such units to India it will not be breaking any Nuclear Suppliers Group restrictions as the units will be operated by Russian personnel and Russia will only be selling electricity to India.

—"India said interested in Russian low-capacity nuclear plant design," Global News Wire, 13 November 2003; in Lexis-Nexis Academic Universe, 13 November 2003, <http://web.lexis-nexis.com>; Vladimir Radyuhin, "Russia offers India floating n-plants," *Hindu*, 20 November 2003; in Lexis-Nexis Academic Universe, 20 November 2003, <http://web.lexis-nexis.com>.

12 November 2003

Russia and India sign a slate of cooperation agreements during Prime Minister Vajpayee's visit to Moscow. The agreements cover cooperation between the Russian Academy of Sciences and India's Department of Science and Technology; the Russian Academy of Sciences and the Indian National Science Academy; and the Russian Air and Space Agency and the Indian Space Research Organization. Another agreement covers cooperation in nuclear power engineering.

—"India, Russia sign cooperation agreements," Global News Wire, 12 November 2003; in Lexis-Nexis Academic Universe, 12 November 2003, <http://web.lexis-nexis.com>.

11 November 2003

Russia's Atomic Energy Ministry states that "it is time to re-examine the ban introduced by the Nuclear Suppliers Group (NSG) on cooperation with India over nuclear technology." In an interview with the Indian newspaper *Hindu*, Russian Atomic Energy Minister Aleksandr Romyantsev says that it is "of crucial importance" to re-examine several aspects of the nuclear suppliers group document and draw up a special agreement on India that "allows it to cooperate with other countries in the nuclear sector." Romyantsev's comments come before his meeting with Indian National Security Advisor Brajesh Mishra in Moscow.

—"Russian ministry wants to lift restrictions on nuclear cooperation with India," Global News Wire, 11 November 2003; in Lexis-Nexis Academic Universe, 11 November 2003, <http://web.lexis-nexis.com>.

6 November 2003

The CANDU Owners Group reportedly rates the heavy water reactors operating in India as the world's best performing plants during the period 1999-2002.

—"India's heavy water reactors rated world's best," Global News Wire, 6 November 2003; in Lexis-Nexis Academic Universe, 15 November 2003, <http://web.lexis-nexis.com>.

4 November 2003

A high-level team from India's Defense Research and Development Organization will reportedly visit Israel in December 2003 to discuss collaboration in India's nuclear submarine program.

—"DRDO team to visit Israel," Global News Wire, 4 November 2003; in Lexis-Nexis Academic Universe, 6 November 2003, <http://web.lexis-nexis.com>.

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24 October 2003

The Chairman of India's Atomic Energy Commission Dr. Anil Kakodkar says that construction of the Advanced Heavy Water Reactor (AHWR) will begin 2004. The reactor fuel for the AHWR will be a hybrid core, partly thorium-uranium 233 and partly thorium-plutonium and will generate 300MWe of power. "We will treat it as a technology demonstrator for thorium utilization which marks the third phase," says Kakodkar. He adds, "this is a system which has operator-forgiving characteristics. It will give a grace period of three days for the operator to intervene in any situation. The demands [on the operator] are not likely to be very stringent." Kakodkar explains that India, which is currently operating 12 Pressurized Heavy Water Reactors, has entered the commercial domain of the first stage of the nuclear program. The beginning of the construction of the Prototype Fast Breeder Reactor (PFBR) in August 2003, marks India's entry into the commercial domain of the second stage. In this context, the construction of the AHWR will constitute India's foray into the third phase of the program. Explaining the design philosophy of the AHWR, Kakodkar maintains that the reactor will incorporate passive design features which do not require human intervention.

—T.S. Subramaniam, "Advanced heavy water reactor construction next year," *Hindu*, 24 October 2003; in Lexis-Nexis Academic Universe, 24 October 2003, <http://web.lexis-nexis.com>.

23 October 2003

The *Hindustan Times* reports that Dr. Y.S.R. Prasad, former head of the Nuclear Power Corporation of India, took up an assignment in Iran after he retired in July 2000. Prasad did not seek the Indian government's permission to take up the assignment in Iran. In light of this episode, the Indian government is revising rules to make it compulsory for Indian nuclear experts seeking employment abroad to obtain the government's approval.

—"Top Indian expert helped Iran develop power plant: report," AFP, 23 October 2003; in Lexis-Nexis Academic Universe, 24 October 2003, <http://web.lexis-nexis.com>.

20 October 2003

Vice Admiral Raman Puri succeeds Lt. General Pankaj Joshi as chief of the Integrated Defense Staff, the unified command that controls India's nuclear weapons.

—"India names new head of defense command for nuclear weapons," Doordarshan Television, 20 October 2003; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

8 October 2003

India's Air Force chief, Air Marshal S. Krishnaswami indicates that India is seriously examining the idea of an aerospace command. "Any country on the fringe of space technology like India has got to work towards an aerospace command as advanced countries are already moving towards laser weapon platforms in space and killer satellites," says Krishnaswami.

—"Aerospace command underway: IAF," *Times of India*, 8 October 2003; in Lexis-Nexis Academic Universe, 7 October 2003, <http://web.lexis-nexis.com>.

6 October 2003

US Secretary of State Colin Powell indicates that the United States and India have made significant progress on the 'trinity issues' or cooperation in the areas of nuclear energy, space, and high-technology. Powell says that the

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"glide path" will bring two years of negotiations to an end. In an interview with *Washington Post*, Powell states, "we have really structured a new relationship with the Indians and it's a quite, quite strong and satisfactory relationship. There were a basket of issues that they were always asking us about...we nicknamed it 'The Trinity'...we have been trying to be as forthcoming as we can because it's in our interest to be forthcoming; but we also have to protect certain red lines that we have with respect to proliferation, because it's sometimes hard to separate within space launch activities and industries and nuclear programs, that which could go to weapons and that which could be solely for peaceful purposes...and also we've had a very productive set of discussions with the Indians over the last, almost two years now about these issues and how close we could get to satisfying these interests without crossing our red lines. And the 'glide path' was a way of bringing closure to this debate," says Powell. Powell explains that the "glide path" is a three-phase plan that would see India undertake measures in the realm of nonproliferation and strengthening domestic export control laws and the US responding with its own steps.

—Sridhar Krishnaswami, "US, India close to agreement on Trinity," *Hindu*, 6 October 2003; Lexis-Nexis Academic Universe, 6 October 2003, <http://web.lexis-nexis.com>.

1 October 2003

During an international conference on cold fusion in Boston, M. Srinivasan, former associate director of the physics group at the Bhabha Atomic Research Center discloses that India stopped funding cold fusion research in 1992. However he urges that India should revive work on cold fusion. "It is evident from the papers presented that cold fusion which was rejected by mainstream scientists 14 years ago is going to bounce back as a fascinating new era of nuclear science," says Srinivasan.

—"India should revive work on cold fusion: scientist," Press Trust of India, 1 October 2003; in Lexis-Nexis Academic Universe, 1 October 2003, <http://web.lexis-nexis.com>.

25 September 2003

Prime Minister Vajpayee and President Bush discuss cooperation in the areas of nuclear energy, space, and high-technology, called the 'trinity items'. India's external affairs minister Yashwant Sinha says negotiations are "in the last lap,...we should be able to see some very concrete results soon."

—"India, US negotiations on ties on trinity items progressing," Press Trust of India, 25 September 2003; in Lexis-Nexis Academic Universe, 25 September 2003, <http://web.lexis-nexis.com>.

23 September 2003

The Indian government proposes to build two nuclear proof bunkers to protect the country's top leadership in case of a nuclear attack. The first bunker will be built in Central Delhi next to the presidential palace that houses offices of the prime minister, the defense and foreign ministries. However, the location of the second bunker is not disclosed.

—"India to build leaders' nuclear bunkers," United Press International, 23 September 2003; in Lexis-Nexis Academic Universe, 24 September 2003, <http://web.lexis-nexis.com>.

18 September 2003

The Chairman of India's Atomic Energy Commission Dr. Anil Kakodkar makes a plea before the General Conference

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of the International Atomic Energy Agency in Vienna that barriers to the peaceful use of nuclear energy must be removed. Kakodkar also underlines India's commitment to nonproliferation and states, "We have a commitment and an interest in contributing as a partner against proliferation...we must shed the baggage inherited from the past which restricts the flow of equipment and technologies related to the peaceful uses of nuclear energy."
—"Barriers to safe n-energy must go," *Hindu*, 18 September 2003; in Lexis-Nexis Academic Universe, 18 September 2003, <http://web.lexis-nexis.com>.

6 September 2003

India's Department of Atomic Energy forms a new company - the Bharatiya Nabhikiya Vidyut Nigam - to build the country's first 500MW fast-breeder reactor near the Madras Atomic Power Station. The new company is formed in association with the Indira Gandhi Center for Atomic Research and the Nuclear Power Corporation of India Ltd. The reactor will use mixed oxide fuel consisting of plutonium carbide and uranium carbide; will attain criticality in 2010; and is expected to start generating power by mid-2010.

—"India to get its first 500-MW PFBR," *Global News Wire*, 6 September 2003; in Lexis-Nexis Academic Universe, 12 September 2003, <http://web.lexis-nexis.com>.

2 September 2003

Prime Minister Vajpayee chairs the first meeting of the Political Council of India's Nuclear Command Authority (NCA). Other members of the council who attended the meeting include the Deputy Prime Minister L.K. Advani, Union Defense Minister George Fernandes, Union Finance Minister Jaswant Singh, and National Security Advisor Brajesh Mishra. Among the agenda items discussed in the meeting are the relationship between the three armed services, the transfer of nuclear assets, and the institution of the Chief of Integrated Defense Staff. The council reportedly reviews the preparedness of the strategic command, the status of the air, land, and under-sea delivery platforms, and the doctrine pertaining to the delivery of nuclear weapons.

—"India holds high-powered meeting to review nuclear deterrence," *Xinhua General News Service*, 2 September 2003; in Lexis-Nexis Academic Universe, 3 September 2003, <http://web.lexis-nexis.com>.

27 August 2003

The Indian government's principal scientific adviser R. Chidambaram says that India faces no obstacles in its nuclear weaponization program, asserting that both plutonium and enriched uranium can be used in India's heavy water reactors. He reiterates that India's nuclear program is indigenous and the reactors are achieving as much as 98.4% of their operating capacity.

—"India Has No Obstacles in Nuke Program," *The Times of India*, 27 August 2004; in Lexis-Nexis Academic Universe, 26 August 2004, <http://www.lexis-nexis.com>.

26 August 2003

At a lecture at the Institute of Defense and Strategic Studies in Singapore, Indian External Affairs Minister Yashwant Sinha expresses concern over the prospect of nuclear weapons falling into terrorist hands in Pakistan. He states, "This is particularly so in the immediate neighborhood of India where it is possible to find the conjunction of authoritarian rule, religious fundamentalism, terrorism, drug trafficking and weapons of mass destruction."

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—"Terrorists Getting Nukes is Asia's Greatest Risk," Press Trust of India, 26 August 2004; in Lexis-Nexis Academic Universe, 26 August 2004; www.lexis-nexis.com.

24 August 2003

During a visit to India by Iranian Foreign Minister Kamal Kharrazi, the Indian government maintains that it has little involvement with pressure on Iran to sign the Additional Protocol, as India is not a member of the Nonproliferation Treaty.

—"Iran's Foreign Minister Meets PM Vajpayee and Sinha," *Indian Express*, 24 August 2004; in Lexis-Nexis Academic Universe, 24 August 2004, www.lexis-nexis.com.

13 August 2003

Indian Vice-Chief of Army Staff Lt. General Shantonu Chowdhury announces, "We have radio intercepts that indicate terrorists could be making attempts to use chemicals and explosives" in the Jammu and Kashmir regions.

—"Army Official Notes Terrorists Plan to Use Chemical Weapons in Kashmir," Global News Wire, 14 August 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

13 August 2003

Naval Chief Admiral Madhavendra Singh says that while India is capable of nuclearization of the sea force, but does not feel the need for nuclear warheads on its ships. In a Doordarshan Interview he says, "We will put a nuclear reactor on a ship when we feel the need to. At the moment, right now we don't feel the need but we are capable."

—"No Plan to Nuclearize Indian Ships Yet - Navy Chief Singh," BBC Monitoring International Reports, 13 August 2003; in Lexis-Nexis Academic Universe, 13 August 2003, <http://web.lexis-nexis.com>.

12 August 2003

Amidst growing concerns about the environmental impact of the uranium mining project in Nalgonda district [Andhra Pradesh state], J.R. Gupta, Chairman and Managing Director of Uranium Corporation of India states that the project will not have any adverse effects on the workers, local residents, water supply or environment.

—"Processed Uranium Plant Will Be Safe," *The Hindu*, 12 August 2003; in Lexis-Nexis Academic Universe, 12 August 2003, <http://web.lexis-nexis.com>.

6 August 2003

The Indian government decides to allow the duty-free import of equipment and samples by an inspection team from the Hague-based Organisation for the Prohibition of Chemical Weapons (OPCW). The action is viewed by India's chemical industry as a prelude to surprise inspections by the OPCW of companies and plants which produce dual-use chemicals and chemical weapons precursors.

—Minocha, Naresh. "India to Permit Int'l Chemical Weapons Inspections," *Chemical News & Intelligence*, 6 August 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

31 July 2003

The Indian government confirms that it is involved in a dialogue with the United States to develop and expand nuclear and space cooperation. The United States and India have initiated five safety-related projects for safeguarded nuclear facilities.

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—"India Confirms Talks Under Way with US on Civilian Nuclear, Space Cooperation," BBC Worldwide Monitoring, 31 July 2003; in Lexis-Nexis Academic Universe, 31 July 2003, <http://web.lexis-nexis.com>.

22 July 2003

India's Atomic Energy Department reveals that due to a valve failure at the Kalpakkam nuclear power plant, six workers suffered the "worst radiation exposure in India's nuclear history." Naresh Bansal, Associate Director of the Bhabha Atomic Research Centre, says that the exposure is higher than the permissible annual exposure but lower than permissible lifetime exposure. The workers continue working at the plant in areas outside the radiation zone.

—S.N.M. Abdi, "India Admits Worst Case of Radiation Exposure at Power Plant; But Government is Silent on the Extent of Contamination Suffered by Six Workers," *South China Morning Post*, 22 July 2003; in Lexis-Nexis Academic Universe, 22 July 2003, <http://web.lexis-nexis.com>.

14 July 2003

As part of the nuclear dialogue between India and the United States, India will send a team of six experts to visit the US Nuclear Regulatory Commission (NRC) during the second week of September 2003. Experts will have a comprehensive discussion on regulatory and safety related topics such as license renewal, periodical safety review, design modifications and retrofits and emergency operating procedures.

—"Indian Team to Visit US Nuclear Regulatory Commission," BBC Worldwide Monitoring, 14 July 2003; in Lexis-Nexis Academic Universe, 14 July 2003, <http://web.lexis-nexis.com>.

7 July 2003

At the "Energy, Environment and Sustainable Development" Symposium organized by the Indira Gandhi Institute of Development Research, Indian President A.P.J. Abdul Kalam says that India's current sources of energy - oil and coal - are depleting and alternate sources need to be found. He suggests the harnessing of nuclear and solar power on a large scale to meet India's energy deficit.

—"Harness Nuclear, Solar Power," *The Hindu*, 7 July 2003; in Lexis-Nexis Academic Universe, 7 July 2003, <http://web.lexis-nexis.com>.

2 July 2003

Indian Foreign Secretary Kanwal Sibal visits the United States to hold another discussion on bilateral cooperation in high-technology areas, including the civilian uses of nuclear technology.

—"Indian Foreign Secretary to Discuss Hi-Tech Cooperation with US Officials," BBC Monitoring International Reports, 2 July 2003; in Lexis-Nexis Academic Universe, 2 July 2003, <http://web.lexis-nexis.com>.

26 June 2003

Indian parliamentary committee holds talks with defense officials to build two bunkers below the main parliament complex to protect ministers of parliament from nuclear and biological attacks.

—"Indian Parliament May Build Bunkers to Protect MPs from Nuclear Attack," Agence France Presse, 26 June 2003; in Lexis-Nexis Academic Universe, 27 June 2003, <http://web.lexis-nexis.com>.

22 June 2003

The Thai Army denies reports that it is developing nuclear weapons with India. Thai Deputy Defense Spokesman

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Major General Palangkoon Klaharn says that the Thai and Indian military were not working on nuclear weapons development, but just sharing knowledge on modern weapons and computer technology related to nuclear weapons.

—Wassan Nanuam, "Thai Army Denies Developing Nuclear Arms with India, Says Cooperating in it," World News Connection, 22 June 2003; in Lexis-Nexis Academic Universe, 22 June 2003, <http://web.lexis-nexis.com>.

20 June 2003

Japan's Defense Agency Chief Shigeru Ishiba holds talks with Indian Defense Minister George Fernandes on his three-day visit to India. Both sides focus on North Korea nuclear issues as well as nuclear concerns involving Pakistan. Fernandes expresses concern over alleged nuclear proliferation between North Korea and Pakistan. Both sides agreed to promote bilateral talks between officials.

—"Japanese Defense Chiefs Discuss Proliferation, Regional Tensions," BBC Monitoring International Reports, 20 June 2003; in Lexis-Nexis Academic Universe, 31 July 2003, <http://web.lexis-nexis.com>.

16 June 2003

The International Atomic Energy Agency plans to undertake case studies in India, Russia and Argentina under its International Project on Innovative Nuclear Reactors and Fuel Cycles (INPRO). INPRO makes recommendations such as strengthening cooperation with other initiatives on innovative nuclear energy, on research and development initiatives in areas such as environmental impact and on proliferation resistance.

—"IAEA Planning INPRO Project in India," Press Trust of India, 16 June 2003; in Lexis-Nexis Academic Universe, 16 June 2003, <http://web.lexis-nexis.com>.

7 June 2003

The Indian Ministry of Defense expresses concern over the presence of Chinese navy ships and nuclear submarines in the Indian Ocean. While the ministry does not suspect China of directly providing military assistance to Pakistan, it is cautious about Chinese activities in Indian waters.

—"Chinese Presence in Indian Ocean Rings Alarm Bells in MoD," *Indian Express*, 7 June 2003; in Lexis-Nexis Academic Universe, 7 June 2003, <http://web.lexis-nexis.com>.

2 June 2003

At a press briefing in Islamabad, Pakistan's Foreign Ministry Spokesman Aziz Ahmed Khan confirms that nuclear security will be on the agenda in talks to be held between India and Pakistan. He also states that Pakistan "assiduously tried to keep South Asia free of nuclear weapons, but was constrained to go nuclear [after India did]."

—"Pakistan Says Nuclear Issue Will Be on Agenda in Talks with India," Deutsche Presse-Agentur, 2 June 2003; in Lexis-Nexis Academic Universe, 6 June 2003, <http://web.lexis-nexis.com>.

1 June 2003

France and Russia want to increase nuclear energy (for civilian purposes) cooperation with India, but guidelines of the Nuclear Suppliers Group (NSG) come in the way. Both countries want a review of the guidelines, which prohibit its members from supplying nuclear technology to any country that has not accepted full-scope safeguards. India has not accepted the full-scope safeguards. Russia states, "We believe that the activities of the NSG should not of

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course create obstacles for international cooperation in the field of peaceful purposes of atomic energy and take into account new realities in this field in an adequate and timely manner."

—"India: France, Russia Want Cooperation in 'Peaceful Uses' of Nuclear Energy," World News Connection, 1 June 2003; in Lexis-Nexis Academic Universe, 15 August 2003, <http://web.lexis-nexis.com>.

31 May 2003

India's annual report of the defense ministry acknowledges improvements in Indo-Chinese relations. However it cautions that every major Indian city is within the reach of Chinese missiles. Furthermore, the asymmetry in nuclear forces between India and China was markedly in China's favor and was likely to become more pronounced as China responded to counter US advances in missile defense. The report also takes note of China's close defense relationship with Pakistan.

—"Defense report softens outlook on China," *Hindu*, 31 May 2003; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

11 May 2003

Prime Minister Atal Bihari Vajpayee addresses a meeting at India's Defense Research & Development Organization (DRDO). In the address Vajpayee criticizes the sanctions imposed by Western countries on India's nuclear and missile sectors and laments that India's impeccable nonproliferation track record has gone unrecognized. "We have denied ourselves many lucrative contracts and joint ventures. We have never received any recognition for this," says Vajpayee. In a reference to India's May 1998 nuclear tests, Vajpayee states that sanctions did not begin in the aftermath of those tests, but had started in 1974 in the aftermath of the first nuclear test. Additional sanctions were imposed under the Missile Technology Control Regime. In his address, the scientific advisor to the defense minister and head of DRDO, Dr. V.K. Aatre appeals to the government to create incentives for scientists to prevent them from leaving India for assignments abroad.

—"Vajpayee flays selective sanctions," *Indian Express*, 11 May 2003; in Lexis-Nexis Academic Universe, 12 May 2003, <http://web.lexis-nexis.com>.

10 May 2003

During his three-day visit to Washington, DC, India's National Security Advisor Brajesh Mishra urges US policy makers to relax supply restrictions on the sale of dual-use nuclear and space technologies to India. Mishra contends that India will not divert such technologies for military programs. Instead, the technologies will enhance scientific research and development in the country.

—Anwar Iqbal, "India asks US for dual-use technology," United Press International, 10 May 2003; in Lexis-Nexis Academic Universe, 11 May 2003, <http://web.lexis-nexis.com>.

5 May 2003

Pakistani Foreign Ministry spokesman Aziz Ahmed Khan says that Pakistan will get rid of its nuclear arsenal if India does the same. "As far as Pakistan is concerned, if India is ready to denuclearize, we would be happy to denuclearize. But it will have to be mutual," he says. In response, Indian Prime Minister Vajpayee states, "Pakistan's atomic program is India-specific. But India's nuclear program is not Pakistan-specific. We have to keep in mind developments in other neighboring states as well."

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—"Pakistan Official: We Will Eliminate Nuclear Weapons if India Does," Associated Press, 5 May 2003; in Lexis-Nexis Academic Universe, 6 May 2003, <http://web.lexis-nexis.com>; "India: Vajpayee on Nuclear Programme," *Infoprod/Financial Times Information*, 8 May 2003; in Lexis-Nexis Academic Universe, 8 May 2003, <http://web.lexis-nexis.com>.

4 May 2003

On a three day visit to India, Japan's Defense Chief Shigeru Ishiba and his Indian counterpart George Fernandes discuss North Korean nuclear weapons-related security issues.

—"Japanese Defense Chief to Visit India to Discuss North Korea, Security," Kyodo News Service, Tokyo, 25 April 2003; in Lexis-Nexis Academic Universe, 25 April 2003, <http://web.lexis-nexis.com>.

3 May 2003

Maharashtra Deputy Chief Minister Chhagan Bhujbal announces the seizure of lethal chemicals and some arms from two nearby militant training centers. The seizure comes in the aftermath of the arrest of six Students Islamic Movement of India activists with links to Lashker-e-Toiba and to Pakistan. Mr. Bhujbal claims that the seized materials include one kilogram of potassium cyanide, bottles of sulphuric acid, ammonium nitrate, nitric acid, as well as firearms.

—"India: Policy Seize 'Lethal Chemicals' Linked to Militant Groups," BBC Monitoring South Asia - Political, 3 May 2003; in Lexis-Nexis Academic Universe, 16 February 2005, [www.lexis-nexis.com](http://web.lexis-nexis.com).

2 May 2003

Speaking in parliament, Indian Prime Minister Atal Behari Vajpayee states that India will resume full diplomatic ties and civil aviation links after a two year break with Pakistan in an attempt to restore peace with the nuclear-armed rival. India also hopes that the move will bring about an end to terrorism in Kashmir.

—Pratap Chakravarty, "India Offers Full Diplomatic, Air Links with Nuclear Rival Pakistan," *Agence France Presse*, 2 May 2003; in Lexis-Nexis Academic Universe, 3 May 2003, <http://web.lexis-nexis.com>.

30 April 2003

The Indian Army's Public Relations Officer Lt.-Colonel S.P.K. Singh alleges that foreign mercenaries in the Jammu and Kashmir region have chemical weapons. He describes how Indian Army intelligence intercepted radio transmissions between guerillas reportedly instructing fighters to "look towards their containers" in the case of heavy losses to Indian federal forces.

—"J&K Ultras Have Chemical Arms," *The Statesman*, 1 May 2003; in Lexis-Nexis Academic Universe, 16 February 2005, [www.lexis-nexis.com](http://web.lexis-nexis.com).

30 April 2003

India's nuclear power plant capacity, which reached a record 89% in December 2002, is expected to reach an average capacity of 90% in 2003.

—"India Breaks Nuke Record," *India Business Insight/Financial Times Information*, 30 April 2003; in Lexis-Nexis Academic Universe, 3 May 2003, <http://web.lexis-nexis.com>.

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25 April 2003

Pakistan alleges to the United States that India is using chemical weapons in Kashmir and asks that the United States intervene in the matter.

—"Pakistan: Daily Expects Armitage's Visit to Prove Breakthrough on Kashmir, Other Issues," Global News Wire, 25 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

23 April 2003

The United Jihad Council accuses India of using "chemical weapons" against militants in "held Kashmir." The Council says in a statement, "India is using chemical weapons against the Mujahideen in sheer violation of all those international laws and principles whose implementation has been declared obligatory by the United Nations.

—"Pakistan: India Warned of 'Serious Repercussions' Against Use of Poisonous Gasses," Global News Wire, 24 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

22 April 2003

The Organization for the Prohibition of Chemical Weapons (OPCW) Director General Rogelio Pfitrter states that India is on target to meet the deadline for destroying some of its chemical weapons. He says that by 29 April 2003, India, the United States, and Russia, "will have destroyed the percentage of munitions and chemical agents that they have committed themselves to reduce under the (1993 chemical weapons) convention."

—Watchdog: US, Russia, India On Track to Reduce Chemical Weapons Stockpiles," Agence France Presse, 22 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

20 April 2003

A report by the US Central Intelligence Agency states that India continues to pursue a more advanced nuclear weapons program. India has already sought the help of Russia and Western European countries for missile-related and dual-use technologies. The report adds that India is engaged in talks with Israel for the Arrow-2 anti-tactical ballistic missile and that Israel might have sold the Harpy unmanned aerial vehicle to India. It further reports that New Delhi has signed a \$270 million contract with Tel Aviv for the supply of the ship-borne Barak-1 surface-to-air missile defense system and is also negotiating the purchase of nuclear submarines and an aircraft carrier from Russia.

—"India Continues to Build More Sophisticated Nuclear Weapons: US Intelligence Report," The Pakistan Newswire, 21 April 2003; in Lexis-Nexis Academic Universe, 21 April 2003, <http://web.lexis-nexis.com>.

16 April 2003

Indian Foreign Secretary Kanwal Sibal tells the private NDTV network that "Pakistan is probably the most irresponsible country in the world" for sponsoring terrorism by Islamic insurgents in Kashmir. He adds that "Pakistan is also irresponsible for its volatile mixture of international terrorism, Islamic fundamentalism and weapons of mass destruction."

—"India Calls Pakistan, 'Most Irresponsible Country,'" World News Communication/AFP, 16 April 2003; in Lexis-Nexis Academic Universe, 19 April 2003, <http://web.lexis-nexis.com>.

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11 April 2003

Pakistani Minister for Information and Broadcasting Shaikh Rashid Ahmed states that India is a "fit case" for pre-emptive strikes owing to its possession of chemical weapons. According to Ahmed, "As far as chemical and biological weapons are concerned, it is India that is active in this field. And it has stockpiled these weapons in neighboring countries." However, Indian Defense Minister George Fernandes and External Affairs Minister Yashwant Sinha reject Ahmed's allegations as false.

—"Pakistan Information Minister Reiterates India Fit Case for Preemptive Strikes," Global News Wire, 12 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com; "Indian Defence Minister Rejects Pakistan's Biological, Chemical Weapons Charge," BBC Monitoring South Asia - Political, 11 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com; "Pakistani Minister Says India Stockpiles Weapons in Other Countries," BBC Monitoring South Asia - Political, 22 April 2003; in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

11 April 2003

Indian Defense Minister George Fernandes endorses comments made earlier by Foreign Minister Yashwant Sinha that Pakistan is a prime candidate for preemptive strikes by the United States as it has weapons of mass destruction and simultaneously supports terrorists. India has accused Pakistan of arming and training Muslim militants in Kashmir. Pakistan denies the charges but says it offers moral and political support for Kashmir's legitimate struggle.

—"Indian Defense Minister Says Pakistan 'Prime Case' for Pre-Emptive Strikes," Associated French Press, 11 April 2003; in Lexis-Nexis Academic Universe, 15 April 2003, <http://web.lexis-nexis.com>.

10 April 2003

The Chief Executive of the Nuclear Fuel Complex (NFC) C. Ganguly tells newspapers that while India is using enriched uranium supplied by Russia to fuel the nuclear plant to be built in Kudankulam, India is capable of producing its own zirconium-niobium clad enriched uranium oxide fuel for the future. India is able to produce this fuel after years of manufacturing experience on industrial scale manufacturing of zirconium alloy hardware and natural and enriched uranium oxide fuels for the Indian reactors.

—"Official Says India Can Make Own Fuel for Nuclear Plant," BBC Monitoring International Reports, 10 April 2003; in Lexis-Nexis Academic Universe, 10 April 2003, <http://web.lexis-nexis.com>.

3 April 2003

According to a report in the Indian newspaper *The Hindu*, India is actively looking for ways to ensure that the Nuclear Suppliers Group (NSG) guidelines do not hinder the growth of nuclear facilities for peaceful purposes. As a supplier of nuclear fuel for some of India's reactors, Russia has faced opposition and criticism within the NSG for violating its commitments to nonproliferation. NSG regulations prohibit the supply of nuclear material and equipment to any country which does not permit full-scope safeguards under the International Atomic Energy Agency (IAEA). India has not accepted the safeguards. Bilateral civilian nuclear cooperation with the United States has been ruled out and, according to the article, India hopes that Russia will raise the issue of exceptions to NSG guidelines in specific instances.

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—Amit Baruah, "India Looking for Ways to Continue Civilian Nuclear Cooperation," *The Hindu*, 3 April 2003; in Lexis-Nexis Academic Universe, 5 April 2003, <http://web.lexis-nexis.com>.

1 April 2003

Indian External Affairs Minister Yashwant Sinha tells *Star News* of that Pakistan is waging a proxy war against India by funding a Jammu and Kashmir separatist group. However, Sinha adds that India will take all steps to prevent war with Pakistan, and will not be the first to use nuclear weapons against Pakistan in the event of a conflict between the two countries.

—"Sinha Says India Not to be First to Use Nuclear Weapons in Any War with Pakistan," World News Connection, 1 April 2003; in Lexis-Nexis Academic Universe, 3 April 2003, <http://web.lexis-nexis.com>.

31 March 2003

According to an AFP report, an official from the state-run Nuclear Power Corporation of India has criticized nuclear supplier countries belonging to the Nuclear Suppliers Group (NSG) for making it difficult for non-members of the Nonproliferation Treaty to acquire civilian nuclear technology. The official said, "Because of technology regimes like the [NSG] and Non-Proliferation Treaty, the technology is not easily traded."

—"India Rues Problem of Importing Nuclear Technology," Agence France Presse, 31 March 2003; in Lexis-Nexis Academic Universe, 31 March 2003, <http://web.lexis-nexis.com>.

31 March 2003

Russian Corporation TVEL agrees to a contract to supply nuclear fuel to India's nuclear power plant in Kudankulam. The deal is worth \$400 million. Specialists from the International Atomic Energy Agency will control the deliveries, storage and loading of nuclear fuel.

—"Russia to Export Fuel for Indian Nuclear Power Plant," BBC Monitoring International Reports, 31 March 2003; in Lexis-Nexis Academic Universe, 31 March 2003, <http://web.lexis-nexis.com>.

6 March 2003

Richard A. Meserve, Chairman of the US Nuclear Regulatory Commission states that United States and India will hold workshops to discuss nuclear plant safety, specifically in fire safety, reactor design and emergency operating procedures. The first workshop will be held in the United States and the second one will be held in India.

—"India, US Will Organize Workshops on N-Plant Safety," Economic Times, 6 March 2003; in Lexis-Nexis Academic Universe, 6 March 2003, <http://web.lexis-nexis.com>.

6 March 2003

India's Junior Minister for External Affairs Digvijay Singh states during question hour at the Rajya Sabha, the upper house of the parliament, that India has asked the international community, including the United States to "examine what additional steps are required to ensure an end to Pakistan's links with terrorism and clandestine proliferation."

—"India Wants International Community to Examine Pakistan 'Links with Terrorism,'" BBC Monitoring International Reports, 6 March 2003; in Lexis-Nexis Academic Universe, 6 March 2003, <http://web.lexis-nexis.com>.

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27 February 2003

Members of the US Nuclear Regulatory Commission praise India's nuclear safety standards. India has 14 reactors and has never had a serious accident.

—Beth Duff-Brown, "American Nuclear Scientists Praise India's Safety Regulations," Associated Press, 27 February 2003; in Lexis-Nexis Academic Universe, 28 February 2003, <http://web.lexis-nexis.com>.

23 February 2003

During his six-day visit to India, Richard A. Meserve, Chairman of the US Nuclear Regulatory Commission announces that the United States will renew its ties with India on nuclear safety cooperation in the areas of license renewal and risk-informed regulation, as well as fire-safety, symptom-based emergency procedures and plant design modifications.

—"India-USA Agree to Expand Nuclear Safety Cooperation," PTI News Agency/BBC Worldwide Monitoring, 27 February 2003; in Lexis-Nexis Academic Universe, 27 February 2003, <http://web.lexis-nexis.com>.

20 February 2003

Junior Minister for External Affairs Digvijay Singh tells the upper house of parliament (Rajya Sabha) that India will only use nuclear weapons in retaliation against "a nuclear attack on our territory or on Indian forces anywhere." India continues to maintain its no-first-use policy.

—"India to Retaliate Against Any Nuclear Attack," BBC Monitoring International Reports, 20 February 2003; in Lexis-Nexis Academic Universe, 20 February 2003, <http://web.lexis-nexis.com>.

19 February 2003

The United States announces sanctions on the Indian company NEC Engineers Private Limited for allegedly contributing to Iraq's biological and chemical weapons program. American officials say that NEC Engineers' transfers of biological and chemical materials to Iraq took place "over a period of time," including but not limited to 2002.

—"US Sanctions Indian Company for Selling Iraq WMD Materials," *The Washington Times*, 2 February 2003; in Lexis-Nexis Academic Universe, 16 February 2005, [www.lexis-nexis.com](http://web.lexis-nexis.com).

15 February 2003

India and Russia sign a \$400 million contract for the supply of nuclear fuel for the Kudankulam atomic power plant in Tamil Nadu. The plant is scheduled to begin operation in 2007. Spent fuel is to be reprocessed and stored in India under the International Atomic Energy Agency control.

—"India, Russia Sign Contract for Supply of Nuclear Fuel for Atomic Power Plant," World News Connection, 15 February 2003; in Lexis-Nexis Academic Universe, 20 February 2003, <http://web.lexis-nexis.com>.

14 February 2003

Indian External Affairs Minister Yashwant Sinha expresses serious concern over Pakistan's involvement in North Korea's nuclear program in an interview with IANS Indo-Asian News Service at the nonaligned countries summit in Kuala Lumpur. Sinha says that the issue did not receive as much attention from the United States and the international community as it should have.

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—"India: Sinha Airs Concern Over Pakistan's Role in North Korea's Nuclear Program," *World News Connection*, 14 February 2003; in Lexis-Nexis Academic Universe, 20 February 2003, <http://web.lexis-nexis.com>.

8 February 2003

Indian Defense Minister George Fernandes reiterates that India has not changed its policy of no-first-use of nuclear weapons. He states, "There could be no change as far as the nuclear doctrine was concerned. It remains as it was."

—"Fernandes Sees No Change in India's Nuclear Doctrine," *World News Connection*, 8 February 2003; in Lexis-Nexis Academic Universe, 11 February 2003, <http://web.lexis-nexis.com>.

6 February 2003

Indian Prime Minister Vajpayee and Iranian President Khatami sign the New Delhi Declaration during Khatami's visit to India. Among other issues of agreement, both sides call for multilateral discussions on nuclear disarmament.

—"Iran, India Sign 'New Delhi Declaration,'" *Global Newswire/Asia Africa Intelligence Wire*, 6 February 2003; in Lexis-Nexis Academic Universe, 7 February 2003, <http://web.lexis-nexis.com>.

4 February 2003

The Director-General of Armed Forces Medical Services Lt. Gen. BN Shahi urges medical personnel to train in preparation for nuclear, biological and chemical warfare.

—"Indian Army Medical Staff Urged to Train for Nuclear Eventuality," *BBC Monitoring International Reports*, 4 February 2003; in Lexis-Nexis Academic Universe, 4 February 2003, <http://web.lexis-nexis.com>.

29 January 2003

Indian Defense Minister George Fernandes warns Pakistan against a nuclear attack. In response to the possibility of Pakistan using nuclear weapons against India he says, "If Pakistan has decided that it wants to get itself destroyed and erased from the world map, then it may take this step of madness, but if it wants to survive then it would not do so."

—"India's Nuclear Warning," *The Daily Telegraph*, 29 January 2003; in Lexis-Nexis Academic Universe, 29 January 2003, <http://web.lexis-nexis.com>.

27 January 2003

Defense Minister George Fernandes warns Pakistan that it will be destroyed and "erased from the world map" should it decide to attack India with nuclear weapons. Fernandes also states "There has been talk of Pakistani nuclear weapons falling in the hands of dangerous elements. We believe whatever the policy of Pakistani leadership towards India, howsoever irresponsible they may be, it is difficult to accept that they would put such weapons in the hands of individuals or organizations who might eventually use them."

—"George Warns Pak on N-Threat," *The Statesman (India)*, 27 January 2003; in Lexis-Nexis Academic Universe, 28 January 2003, <http://web.lexis-nexis.com>.

19 January 2003

Russia and India sign a nuclear safety agreement in Mumbai during a visit to India by Yuriy Vishnevskiy, Head of Russia's Federal Monitoring Authority for Nuclear and Radiation Safety. The two countries agree to develop

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bilateral cooperation in regulating safety while using nuclear energy for peaceful purposes. Russia and India have a number of contracts on supplying materials and equipment for the nuclear power plant and sending Russian experts on a mission to install the equipment.

—"Russia, India Sign Nuclear Safety Agreement," BBC Worldwide Monitoring, 19 January 2003; in Lexis-Nexis Academic Universe, 19 January 2003, <http://web.lexis-nexis.com>.

18 January 2003

India and United States decide to continue communications on missile defenses and related issues. "The two sides discussed security contributions that missile defense could make ... the meeting also provided an opportunity to review the latest developments in the US missile defense policy and program," says an Indian external affairs ministry spokesperson.

—"Indo-US Talks on Missile Defense to Continue," *Times of India*, 18 January 2003; in Lexis-Nexis Academic Universe, 18 January 2003, <http://web.lexis-nexis.com>.

16 January 2003

India's current rotating Chief of Joint Armed Forces Command Admiral Madhvendra Singh dismisses speculation that the army, air force and navy are reluctant to surrender their nuclear arsenals to the newly formed Nuclear Command Authority which will decide the use of nuclear weapons. Singh states, "There will be no problems over the transfer of command and control of the nuclear weapons."

—"No Squabbling for Nuclear Button: India's Chief Commander," Agence France Presse, 16 January 2003; in Lexis-Nexis Academic Universe, 17 January 2003, <http://web.lexis-nexis.com>.

16 January 2003

The Indian Atomic Energy Regulatory Board (AERB) and the Federal Nuclear and Radiation Safety Authority of Russia sign an agreement for cooperation in the field of safety regulation in the peaceful uses of nuclear energy. The AERB intends to familiarize itself with ensuring safety of nuclear power plant personnel and the public and protection of the environment against any possible harmful effects of radiation.

—"India, Russia Sign Agreement for Nuclear Safety," Xinhua News Agency, 16 January 2003; in Lexis-Nexis Academic Universe, 17 January 2003, <http://web.lexis-nexis.com>.

13 January 2003

Indian Defense Minister George Fernandes says that India will not review its "no-first-use" policy.

—"India Not to Review No First Use Nuclear Policy," PTI News Agency, New Delhi, 13 January 2003; in Lexis-Nexis Academic Universe, 14 January 2003, <http://web.lexis-nexis.com>.

12 January 2003

Pakistan's foreign office says that India's recent disclosure of its eight point nuclear doctrine and the formation of a Nuclear Command Authority only adds greater insecurity to the region as it is further evidence that nuclear weapons and their use is part of India's strategic policy.

—Nadeem Iqbal, "India's Nuke Doctrine Adds to Insecurity - Pakistan," Inter Press Service, 12 January 2003; in Lexis-Nexis Academic Universe, 14 January 2003, <http://web.lexis-nexis.com>.

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8 January 2003

The CIA names India, Pakistan, Iran and North Korea "secondary proliferators" because they are not members of control regimes such as Nuclear Suppliers Group, Australia Group, and Missile Technology Control Regime. "Under economic pressure, need for lucrative foreign sales is a strong incentive to supplying entities, particular in case of dual-use items and technology," the CIA says.

—"India, Pak, 2 others clubbed by CIA as Secondary Proliferators," Press Trust of India, 8 January 2003; in Lexis-Nexis Academic Universe, 8 January 2003, <http://web.lexis-nexis.com>.

7 January 2003

Indian Defense Minister George Fernandes warns that Pakistan will be wiped out if India responds to a nuclear attack on its territory by Pakistan. He says, "We can take a bomb or two or more ... but when we respond there will be no Pakistan." The statement was made in response to a statement by General Musharraf who said last month that he had warned India "they should not expect a conventional war from Pakistan" if Indian troops entered Pakistan during last year's tense 10-month military stand-off.

—"Indian Defense Minister Warns Pakistan Against Nuclear Rhetoric," Agence France Presse, 7 January 2003; in Lexis-Nexis Academic Universe, 7 January 2003, <http://web.lexis-nexis.com>.

6 January 2003

In a comment on India's nuclear posture announcement, Pakistani Foreign Office Spokesman Aziz Khan says, "India's announcement to use nuclear weapons if attacked with biological or chemical weapons signals an important extension of India's policy of using nuclear weapons. This is further evidence that nuclear weapons and their use is very much a part of India's strategic policy."

—"Operation Against Terrorists Only by Pakistani Forces: FO," *The Pakistan Newswire*, 6 January 2003, in Lexis-Nexis Academic Universe, 16 February 2005, www.lexis-nexis.com.

5 January 2003

The Indian government announces a new nuclear posture that allows India to "retain the option of retaliating with nuclear weapons" in the event of a major biological or chemical attack against India or Indian forces anywhere.

—"India Establishes a Nuclear Command System," *The New York Times*, 5 January 2003, www.nytimes.com.

5 January 2003

India outlines an eight-point nuclear doctrine. The doctrine's features include: a no-first-use posture; authorization of retaliatory attacks solely by civilian political leadership through the Nuclear Command Authority; the building and maintaining of a credible minimum deterrent; non-use of nuclear weapons against non-nuclear weapon states; the right to use nuclear weapons in retaliation to chemical and biological attacks; strict export controls; participation in the proposed fissile material cut-off treaty; continued observance of the ban on nuclear testing; and commitment to the goal of a nuclear weapons-free world through global, verifiable and non-discriminatory nuclear disarmament.

—"India Outlines 8-Point Nuclear Doctrine," Xinhua News Service, 5 January 2003; in Lexis-Nexis Academic Universe, 5 January 2003, <http://web.lexis-nexis.com>.

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4 January 2003

India plans to build thorium based advanced heavy water reactors with new safety features in two years. The reactors will increase the nuclear energy production for civilian purposes.

—"Thorium Based Nuclear Reactors Designed by India Scientists," Xinhua General News, 4 January 2003; in Lexis-Nexis Academic Universe, 4 January 2003, <http://web.lexis-nexis.com>.

2 January 2003

India and Pakistan exchange lists of their nuclear facilities and installations as stipulated under the Agreement on the Prohibition of Attack Against Nuclear Installations and Facilities, signed by the two countries in 1988. This is the 12th time the two countries have exchanged this information.

—Amit Baruah, "India, Pak. Exchange List of N-Installations," *The Hindu*, 2 January 2003; in Lexis-Nexis Academic Universe, 2 January 2003, <http://web.lexis-nexis.com>.

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2002**30 December 2002**

With regards to the 2001 military standoff between India and Pakistan Pakistani President General Musharraf states: "I personally conveyed the message to Prime Minister Vajpayee through every international leader who came to Pakistan, that if Indian troops moved a single step across the international border or the Line of Control, they should not expect a conventional war from Pakistan."

—"Musharraf Says Pakistan was Ready to Use Nuclear Weapons," Japan Economic Newswire, 20 December 2002; in Lexis-Nexis Academic Universe, 30 December 2002, <http://web.lexis-nexis.com>.

27 December 2002

India and Pakistan agree to exchange lists of their nuclear installations under an agreement which prohibits the two countries from attacking each others' nuclear installations. India and Pakistan signed the agreement on 31st December 1988 to exchange lists of nuclear installations. The agreement entered into force on 27 January 1991, and the first exchange of lists took place on 1 January 1992.

—"Pakistan, India to Exchange List of Nuclear Installations on 1 January" BBC Monitoring International Reports, 27 December 2002; in Lexis-Nexis Academic Universe, 27 December 2002, <http://web.lexis-nexis.com>.

20 December 2002

The Chairman of the Atomic Energy Commission in India, Dr. Anil Kakodkar, unveils a Rs. 100-Crore program to change the nuclear energy program by tapping thorium as an alternative to uranium, the traditional source of nuclear energy.

—"Programme to Tap Thorium for N-Energy," *The Hindu*, 20 December 2002; in Lexis-Nexis Academic Universe, 19 December 2002, <http://web.lexis-nexis.com>.

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20 December 2002

India reiterates its unilateral moratorium on further nuclear weapons testing.

—"No More Nuclear tests, Says Govt," *The Economic Times*, 20 December 2002; in Lexis-Nexis Academic Universe, 20 December 2002, <http://web.lexis-nexis.com>.

18 December 2002

Indian Defense Minister George Fernandes says that India has initiated steps to ensure protection from nuclear and biological attacks in response to Pakistan's recently test of the medium-range, nuclear capable ballistic missile, the Hatf-4. He also says that the Army Headquarters and the Institution of Engineers had recently conducted a day-long seminar on disaster management with a reference to nuclear attacks.

—"India Takes "Necessary Steps" for Protection Against Nuclear Attack," BBC Monitoring International Reports, 18 December 2002; in Lexis-Nexis Academic Universe, 18 December 2002, <http://web.lexis-nexis.com>.

15 December 2002

Referring to India's nuclear weapons program, Indian President A.P.J. Abdul Kalam tells a group of 1,000 students that India would not be respected if it did not have strength. He says, "Strength respects strength. Unless we have strength we are not respected." He also reminds students of India's no-first-use policy, that nuclear weapons are meant for defense and that nuclear power can be used for electricity generation and medicine.

—"Unless India Has Strength It Would Not Be Respected," Press Trust of India, 15 December 2002; in Lexis-Nexis Academic Universe, 15 December 2002, <http://web.lexis-nexis.com>.

10 December 2002

The Principal Scientific Advisor to the Government of India Dr. R. Chidambaram delivers the Presidential address at a three-day conference on "Characterization and Quality Control of Nuclear Fuels" in Hyderabad. With reference to international atomic energy safeguard systems Chidambaram says that while India supports safeguards measures, "irrational prejudice against closing the nuclear fuel cycle and reprocessing must be given up." He later states that India's nuclear program is in accordance with the International Atomic Energy Agency's safeguards.

—"Prejudice Against Nuclear Reprocessing Must Go," Press Trust of India, 10 December 2002; in Lexis-Nexis Academic Universe, 10 December 2002, <http://web.lexis-nexis.com>.

5 December 2002

Pyongyang objects to India's protest on the possible nuclear ties between North Korea and Pakistan, after reports in American newspapers highlight those links. North Korea cautions that such allegations can strain relations between India and Pakistan. New Delhi has asked the international community to investigate the matter because it is of security concern to India.

—"India: North Korean Embassy Protests Suggested Nuclear Links with Pakistan," *The Asian Age*, 5 December 2002; in Lexis-Nexis Academic Universe, 5 December 2002, <http://web.lexis-nexis.com>.

4 December 2002

During his three-day visit to India Russian President Vladimir Putin says that Russia will cooperate with India in developing nuclear energy. Russia is already building two 1,000 MW reactors. "Our cooperation in this field is

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successful. We work within the framework of international rules and obligations and continue to abide by these obligations," says Putin.

—"Russia Wants Further Cooperation with India on Nuclear Energy," Agence France Presse, 4 December 2002; in Lexis-Nexis Academic Universe, 4 December 2002, <http://web.lexis-nexis.com>.

3 December 2002

The Indian navy declines to comment on *The Times of India* newspaper report that India is planning to lease the Akula II class nuclear submarine from Russia for a period of three years.

—"India Stays Mum on Nuclear-Sub Story," *The St. Petersburg Times*, 3 December 2002; in Lexis-Nexis Academic Universe, 17 December 2002, <http://web.lexis-nexis.com>.

29 November 2002

Minister of State for Atomic Energy Vasundhara Raje tells Parliament that the six nuclear leaks which occurred at Indian nuclear plants were "minor" and did not have any significant impact on the public or environment. "The few incidents of leakage of tritiated heavy water did not have any significant impact on the public and environment," says Raje. She admits however that the radiation does release into the Rana Pratap Sagar lake on 5 May 1998 exceeded the limit prescribed by the Atomic Energy Regulatory board. However, the maintenance and operational procedures at the plants were "scrupulously followed" and a disaster like Chernobyl was "highly unlikely."

—"India admits to six 'minor' leaks in nuclear power plants," *Channel News Asia*, 29 November 2002; in Lexis-Nexis Academic World, 29 November 2002, <http://web.lexis-nexis.com>.

28 November 2002

Indian Federal Junior Minister of External Affairs Digvijay Singh expresses serious concern over Pakistan's alleged exchange of nuclear technology with North Korea.

—"India Concerned Over Pak's Nuke-Tech Exchange with N. Korea," Press Trust of India, 28 November 2002; in Lexis-Nexis Academic Universe, 28 November 2002, <http://web.lexis-nexis.com>.

26 November 2002

India demands a full-fledged investigation into Pakistan's alleged exchange of nuclear materials with North Korea. Indian Foreign Ministry Spokesperson Navtej Sarna states, "Because of the grave nature of these reports and the implication for international security, the facts need to be properly investigated by the concerned international regime."

—"India Calls for Probe Into Pakistan-North Korea Nuclear Links," Agence France Presse, 26 November 2002; in Lexis-Nexis Academic Universe, 26 November 2002, <http://web.lexis-nexis.com>.

22 November 2002

Atomic Energy Commission Chairman Dr. Anil Kakodkar says that India has achieved 90 to 95 percent self-reliance in nuclear energy and within the next five years, it will be considered a leader in fast breeder reactors and Thorium reactors. At present India's nuclear energy is under three percent of the total energy output. The number is expected to increase to 5 percent by the end of 2010.

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—"India Said Achieves 90-95 Percent Reliance in Nuclear Energy Field," World News Connection, 22 November 2002; in Lexis-Nexis Academic Universe, 26 November 2002, <http://web.lexis-nexis.com>.

21 November 2002

The Indian government asserts that nuclear plants in India are safe, despite the recent blast at a nuclear facility in Hyderabad. Vasundhara Raje, Minister of State for Atomic Energy, states that India strictly follows international safety norms, adding, "There is almost near total compliance by all these plants... There is no question of compromising (the) safety of workers at nuclear plants." Officials claim that the Hyderabad blast did not cause any leakage of radioactive materials as it occurred in an area away from the processing unit.

—"India's Domestic Nuclear Energy Facilities Safe: Government," Agence France Presse, 21 November 2002; in Lexis-Nexis Academic Universe, 21 November 2002, <http://web.lexis-nexis.com>.

20 November 2002

Bhabha Atomic Research Center Chairman Dr. Anil Kakodkar says that with the support of the government, India is on an accelerated path to enhancing its nuclear power and self-reliance in nuclear energy. The Indian government has allocated 300 billion rupees (US \$6.2 billion) for atomic energy research.

—"India on an Accelerated Path in Nuclear Power: BARC Chief," *Asia Pulse*, 20 November 2002; in Lexis-Nexis Academic Universe, 21 November 2002, <http://web.lexis-nexis.com>.

19 November 2002

A minor blast occurs at the uranium oxide plant at the Nuclear Fuel Complex in Hyderabad. While no injuries are reported, concerns exist that some radioactive materials might have been released into the atmosphere.

—"Blast at Nuclear Complex in Hyderabad," *The Times of India*, 19 November 2002; in Lexis-Nexis Academic Universe, 19 November 2002, <http://web.lexis-nexis.com>.

15 November 2002

India's President A.P.J. Abdul Kalam states that despite India's nuclear doctrine of no-first-use, India will use its nuclear weapons if peace in the region is threatened and if another country attacks India with nuclear weapons. He says, "We have taken a decision that India will not use nuclear weapons first but when peace is threatened and somebody else uses it, India will use it for defending the country When two of our neighbors have got nuclear weapons, naturally for India, to protect peace, we have to have it."

—"India Ready to Retaliate with Nuclear Weapons: President," *Asia Pulse*, 15 November 2002; in Lexis-Nexis Academic Universe, 15 November 2002, <http://web.lexis-nexis.com>.

13 November 2002

At a meeting in New Delhi, US Undersecretary of State Kenneth Juster and Indian Foreign Minister Yashwant Sinha agree to examine potential cooperation in the space and civilian nuclear sectors. The US had earlier avoided such cooperation due to concerns that civilian technologies could be diverted toward India's nuclear and missile programs.

—"India and US Agree to Examine Nuclear, Space Cooperation," Agence France Presse, 13 November 2002; in Lexis-Nexis Academic Universe, 13 November 2002, <http://web.lexis-nexis.com>.

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10 November 2002

India's Central Industrial Security Force begins creating a 'first responder' task force to prepare for emergencies concerning potential nuclear and biological attacks. The task force is expected to be well trained and equipped and will collaborate with the Air Force for the provision of an airlift capability.

—"Special Force to Tackle Nuclear or Biological Attack in India," Xinhua News Agency, 10 November 2002; in Lexis-Nexis Academic Universe, 11 November 2002, <http://web.lexis-nexis.com>.

5 November 2002

India expresses its support for the Bangkok Treaty which legalizes the idea of a nuclear weapons free zone in Southeast Asia.

—Jim Gomez, "Southeast Asian Leaders Hold First-Ever Summit with Nuclear India," Associated Press, 5 November 2002; in Lexis-Nexis Academic Universe, 5 November 2002, <http://web.lexis-nexis.com>.

31 October 2002

Prime Minister Vajpayee formally opens India's second nuclear waste immobilization plant at the Bhabha Atomic Research Center (BARC). The first such plant is located at Tarapur and a third is being constructed on the premises of the Madras Atomic Power Station, Kalpakkam. The BARC plant has facilities for handling low-, moderate-, and high-level radioactive waste.

—"Vajpayee declares open waste immobilization plant," Press Trust of India, 31 October 2002; in Lexis-Nexis Academic Universe, 31 October 2002, <http://web.lexis-nexis.com>.

31 October 2002

In an address at the Bhabha Atomic Research Center (BARC) on the occasion of its founding day, Prime Minister Vajpayee calls upon the legally recognized nuclear states to address the clandestine transfers and trade in nuclear and missile technologies. Instead of targeting countries such as India that have played by the nuclear rules, says Vajpayee, the nuclear powers should tackle the illegal transfers. He states that "we [India] have been denied technologies and products on the unfounded suspicion that they might be applied to a weapons program...these technology regimes have irritated us, they have retarded our progress...however these denials did not stop us and brought out the best in us."

—"Tackle illegal nuke technology transfer: PM," Press Trust of India, 31 October 2002; in Lexis-Nexis Academic Universe, 31 October 2002, <http://web.lexis-nexis.com>.

28 October 2002

In an address to the UN conference on climate change, the Joint Secretary at India's power ministry Ajay Shankar says that India proposes to increase utilization of hydropower and nuclear energy to meet its future energy demands. Although India will continue to rely on thermal power, it hopes to increase nuclear power generation to 20,000 MW by 2020. "We are looking at energy mix in India by 2012 - to reduce carbon intensity - with thrust on hydro, renewable and nuclear energy," says Shankar.

—"India to increase its nuclear power generation tenfold by 2020," *Asia Pulse*, 28 October 2002; in Lexis-Nexis Academic Universe, 28 October 2002, <http://web.lexis-nexis.com>.

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27 October 2002

In a public address, Prime Minister Atal Behari Vajpayee expresses concerns that chemical and biological weapons are difficult to detect; and that such weapons could fall into the hands of non-state actors.

—"Goals, Not Dates, First: PM," Indian Express, 27 October 2002; in Lexis-Nexis Academic Universe, 14 February 2005, www.lexis-nexis.com.

26 October 2002

India's Atomic Energy Regulatory Board (AERB) denies a report published in the *Christian Science Monitor* which states that India's nuclear power reactors are unsafe and high levels of radiation. AERB states that "the report does not reflect the correct safety status of nuclear power plants in India. It is biased and one-sided and has used uncritically, a series of unsubstantiated statements of known and unnamed anti-nuclear critics in India." AERB Secretary K.S. Parthasarathy also says that the news report is based on a 20-month old statement by AERB chairman Sukatme who had said that the collective dose per Gwe-year (giga watt electrical) to workers at the Kakrapur Atomic Power Station was over three times the best values in the world. However, Parthasarathy concedes the need for reducing exposure to workers.

—"AERB denies report terming India's n-reactors as unsafe," Press Trust of India, 26 October 2002; in Lexis-Nexis Academic Universe, 27 October 2002, <http://web.lexis-nexis.com>.

18 October 2002

The Chairman and Managing Director of the Nuclear Power Corporation of India Ltd. states that a panel of world experts from the World Association of Nuclear Operators (WANO) will review the functioning of the two units of the Rajasthan Atomic Power Station (RAPS). The review will provide the inputs for internal improvements in the plants if necessary. Chaturvedi also discloses that the construction of units 5 and 6 at RAPS will be last pair of 220MW reactors in the pressurized heavy water reactor series and all "inland sites will have 500MW fast breeder reactors (FBR) in future as the standardization of the FBR design has been achieved..."

—"RAPS-review," Press Trust of India, 18 October 2002; in Lexis-Nexis Academic Universe, 20 October 2002, <http://web.lexis-nexis.com>.

30 September 2002

The chief of India's integrated defense staff General Pankaj Joshi states that "we [the armed services] are in the process of raising a strategic forces command with all assets, like aircraft, land-based missiles, and nuclear weapons and bombs...it will be a fighting command and will become operational soon." He adds, "it defies logic that a country of this size...should not have a nuclear command and control structure." Joshi reiterates that India's nuclear arsenal is a "political" one and "not intended to be a military one."

—Elizabeth Roche, "India forging special unit to operate nuclear arsenal: official," AFP, 30 September 2002; in Lexis-Nexis Academic Universe, 1 October 2002, <http://web.lexis-nexis.com>.

26 September 2002

In an address at the Institute of Strategic and International Studies, Kuala Lumpur, Malaysia, India's Foreign Minister Yashwant Sinha reiterates India's commitment to sign the nuclear weapons free zone agreement with ASEAN soon. Sinha states, "As regards o ASEAN, I reiterate what has been said earlier, namely, that we fully

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respect the status of the nuclear free zone in South East Asia and are ready to convert this commitment into a legal obligation."

—"India keen to sign nuclear-free zone treaty with ASEAN," Malaysia General News, 26 September 2002; in Lexis-Nexis Academic Universe, 3 October 2002, <http://web.lexis-nexis.com>.

24 September 2002

British Prime Minister Tony Blair singles out the Indian company NEC Engineers Private Limited for "illicitly" helping Iraq in expanding its missile and chemical weapons arsenal. The Indian government, in response, finds Mr. Blair's "selective reference" to the Indian company "unfortunate" but it also accuses NEC Engineers of exporting sensitive equipment to Iraq.

—Shishir Gupta, "Arms Control: the Indian Connection," *India Today*, 14 October 2002, www.india-today.com.

19 September 2002

The Chairman of the Atomic Energy Commission Dr. Anil Kakodkar voices concerns over the denial of civilian nuclear technologies to India. Kakodkar states that "...in practice technologies continue to be denied even for systems important to safety." Such denial policies slow down India's expansion of nuclear power and increase dependence on fossil fuels and further damage to the global environment. Kakodkar also dwells upon the need to eliminate the possibility of terrorists using nuclear material and radioactive sources for blackmail. He points out that India is a signatory to the Convention on Physical Protection of Nuclear Material and has in place strict physical protection measures for nuclear material in use, storage, and transport.

—"India concerned over nuke technology denial to few nations," Press Trust of India, 19 September 2002; in Lexis-Nexis Academic Universe, 19 September 2002, <http://web.lexis-nexis.com>.

16 September 2002

The head of the computer division at the Bhabha Atomic Research Center (BARC) H.K. Kaura claims that BARC has developed a new supercomputer - the ANUPAM-PIV 64-node computer - which has achieved a speed of 43 giga flops. In comparison, the Cray SV1 supercomputer that India imported from the United States for the National Center for Medium Range Weather Forecasts has a sustained speed of four giga flops.

—"India's BARC develops fastest supercomputer in the country," *Asia Pulse*, 16 September 2002; in Lexis-Nexis Academic Universe, 16 September 2002, <http://web.lexis-nexis.com>.

13 September 2002

Indian Prime Minister Atal Behari Vajpayee rebuts Pakistani President Pervez Musharraf's comments in his speech before the UN General Assembly. Vajpayee accuses Pakistan of engaging in "nuclear blackmail" and using terror as an instrument of state policy against India.

—Devidas Gupta, "UN-LD PM," Press Trust of India, 13 September 2002; in Lexis-Nexis Academic Universe, 13 September 2002, <http://web.lexis-nexis.com>.

12 September 2002

In a speech before the UN General Assembly in New York, Pakistani President Pervez Musharraf states that Pakistan will not start a war with India, but if attacked will use every means for self-defense. In this regard,

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Musharraf reiterates that Pakistan cannot rule out the 'first-use' of nuclear weapons.

—"Musharraf: If attacked, Pakistan to use every means of self-defense," Federal Information and News Dispatch, Inc., 12 September 2002; in Lexis-Nexis Academic Universe, 13 September 2002, <http://web.lexis-nexis.com>.

6 September 2002

The Indian government defends its position to embargo certain chemicals to Iraq before the Delhi High Court, claiming the order was issued following intelligence reports that the Indian company NEC Engineers Private Limited might be actively assisting in Iraq's chemical weapons program. Indian government representatives Additional Solicitor General K.K. Sud and Jayant Bhushan tell the court, "This is a very serious matter which will harm India's interest and have international ramification. There are intelligence reports that these chemicals may be used to developing chemical weapons in Iraq." Senior advocate R K Anand, appearing for NEC Engineers, said the company was only an exporter buying the chemicals for use in manufacturing paints.

—"HC-Iraq," Press Trust of India, 6 September 2002; in Lexis-Nexis Academic Universe, 14 February 2005, [www.lexis-nexis.com](http://web.lexis-nexis.com).

29 August 2002

The Indian Navy is seeking cooperation from private sector Indian companies such as Godrej Aerospace, Bharat Aluminum, and Larsen and Toubro for its nuclear submarine program. Government and quasi-government entities participating in the program include the Department of High Voltage Engineering, Indian Institute of Science (IISc), Bangalore; the Electronics and Radar Establishment, Research Center Imarat (RCI), Hyderabad; and Electronics Research & Development Center, Kolkata.

—"Navy takes recourse to home grown expertise," 29 August 2002, India Business Insight; in Lexis-Nexis Academic Universe, 2 September 2002, <http://web.lexis-nexis.com>.

26 August 2002

India's Department of Revenue Intelligence (DRI) releases a report outlining its ongoing investigation of five subsidiaries of the Indian company NEC Engineers Private Limited for allegedly supplying technology and equipment to Iraq for its missile and chemical weapons programs. According to the DRI, NEC Engineers "actively assisted" Iraq in setting up a chlorine plant in Fallujah by exporting sensitive membranes and centrifugal pumps. India's external intelligence agency, Research & Analysis Wing (RAW), and appropriate U.S. agencies are also involved in the investigation.

—"Indian Firms Probed for Alleged Weapons Technology Sales to Iraq: Report," Agence France Presse, 26 August 2002; in Lexis-Nexis Academic Universe, 14 February 2005, [www.lexis-nexis.com](http://web.lexis-nexis.com); Shishir Gupta, "Arms Control: the Indian Connection," *India Today*, 14 October 2002, www.india-today.com.

9 August 2002

Indian Defense Minister George Fernandes claims that the process of creating a Strategic Forces Command is proceeding rapidly and the integration of the three services as recommended by the Group of Ministers will be completed shortly.

—"Nuclear forces command to be in place soon," Press Trust of India, 9 August 2002; in Lexis-Nexis Academic Universe, 11 August 2001, <http://web.lexis-nexis.com>.

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2 August 2002

The Chairman and Managing Director of the Nuclear Power Corporation of India Limited (NPCIL) says that the federal government is planning to encourage private sector participation in the nuclear power sector. He says that the Koodandulam nuclear power plant will eventually have six units of which two are already under construction. Construction of the third and fourth units will be started in 2004-05 and the fifth and sixth units in 2008. The NPCIL currently has eight units under construction and the goal is to add 800MW of power annually for the next five or six years.

—"Proposal to amend Atomic Energy Act to encourage pvt. sector," Press Trust of India, 2 August 2002; in Lexis-Nexis Academic Universe, 5 August 2002, <http://web.lexis-nexis.com>.

14 July 2002

Pakistani President Pervez Musharraf tells a group of newspaper editors and columnists that India is unable to attack Pakistan not only because Pakistan possesses nuclear weapons but also because Pakistan is equivalent to India in military strength.

—"India will not attack Pakistan: Musharraf," Press Trust of India, 14 July 2002; in Lexis-Nexis Academic Universe, 14 July 2002, <http://web.lexis-nexis.com>.

11 July 2002

The Chief Controller of India's Defense Research & Development Organization (DRDO), R.V. Swamy claims that DRDO has developed a multipurpose field shelter for the Army. The shelter is a self-contained unit and can be used to accommodate and protect about 30 people from a nuclear, biological, or chemical attack for a period of 96 hours at a certain distance from ground zero. It can be used as a command post, observation post, regimental aid center, and communications center. The shelters, which are fitted with anti-radiation devices and filters can also be mass produced for civilian use or installed at the seat of the government in New Delhi. In addition, DRDO has also developed three sensors that can be mounted on vehicles to detect nuclear, chemical and biological attacks.

—"India claims to have developed nuclear-protection shelter," Xinhua General News Service, 11 July 2002; in Lexis-Nexis Academic Universe, 12 July 2002, <http://web.lexis-nexis.com>; Pratap Chakravarty, "India readies nuclear shelters, trains military against first-strike," AFP, 11 July 2002; in Lexis-Nexis Academic Universe, 12 July 2002, <http://web.lexis-nexis.com>.

18 June 2002

India denounces Pakistani President Pervez Musharraf's statement that Pakistan's nuclear arsenal had deterred India from launching a war against Pakistan. The Indian Foreign Ministry says, "The international community should not ignore such continued manifestations of Pakistani irresponsibility, loose talk and undiluted hostility towards India and the continued concoction of doomsday theory to justify Pakistan's use of nuclear blackmail."

—Uttara Choudhury, "India denounces Musharraf deterrence remark as "nuclear blackmail," AFP, 18 June 2002; in Lexis-Nexis Academic Universe, 19 June 2002, <http://web.lexis-nexis.com>.

18 June 2002

In a dinner address to defense scientists and engineers Pakistani President Pervez Musharraf says that Pakistan's nuclear arsenal had deterred India from mounting an all-out attack during the recent military stand-off. In a

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reference to Pakistan's May 1998 nuclear tests, Musharraf says that "we were compelled to show them in May 1998 that we were not bluffing, and in May 2002 again we were compelled to show that we do not bluff...by testing with outstanding success the delivery systems of our strategic capability..." Musharraf adds, "today's heightened international concerns of a nuclear conflict in South Asia, and the hesitation, frustration, and inability of India to attack Pakistan or conduct a so called limited war, bear ample testimony to the fact that strategic balance exists in South Asia."

—Sami Zuberi, "Nuclear deterrent gave India second thoughts: Musharraf," 18 June 2002; in Lexis-Nexis Academic Universe, 19 June 2002, <http://web.lexis-nexis.com>.

17 June 2002

In an interview with the daily *Dainik Jagran* India's Prime Minister Atal Bihari Vajpayee explains the reasons why India has decided to step back from the six-month military standoff with Pakistan. Vajpayee claims that Pakistan's promises to end infiltration into Kashmir and crack down on the militants and not US pressure have prevented war between India and Pakistan. "If Pakistan had not agreed to end infiltration, and America not conveyed that guarantee," says Vajpayee, "then war would not have been averted." He also insists that the belief that "India gave up the option of war under American pressure is totally wrong."

—Neelesh Misra, "Vajpayee: Pakistan's promises, not US pressure on India helped avert war," AP, 17 June 2002; in Lexis-Nexis Academic Universe, 18 June 2002, <http://web.lexis-nexis.com>.

17 June 2002

India asserts that it has not foreclosed options for exerting economic pressure on Pakistan. An Indian Foreign Ministry spokesperson says, "The options are pretty much open still...we probably need to review the situation...till now this has not kicked into operation. The scenario is still developing. We cannot foreclose any such option."

—"India has not foreclosed option of economic pressures on Pak.," Press Trust of India, 17 June 2002; in Lexis-Nexis Academic Universe, 17 June 2002, <http://web.lexis-nexis.com>.

15 June 2002

The Indian Air Force IAF has reportedly indicated to the Ministry of Defense that it cannot wait for the completion of the indigenous Light Combat Aircraft (LCA) and would instead prefer to procure 140 Mirage 2000 aircraft from France. The aircraft could be produced at the Hindustan Aeronautics Limited plant in Bangalore. The IAF already operates two Mirage 2000 squadrons and the cabinet has already approved the procurement of four single-seat and six double seat Mirage aircraft as replenishment for the fleet.

—K.R. Sreenivas, "IAF to buy 140 Mirage aircraft, looks to HAL," *Times of India*, 15 June 2002; in Lexis-Nexis Academic Universe, 17 June 2002, <http://web.lexis-nexis.com>.

15 June 2002

Subsequent to his visit to India and Pakistan, US Defense Secretary Donald Rumsfeld says that the two countries "are both sensitive to the risks and I was impressed in talking to them and I think they are both asserting leadership in a way that is positive rather than negative."

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—"India, Pak aware of conflict's risks: Rumsfeld," 15 June 2002, Press Trust of India; in Lexis-Nexis Academic Universe, 16 June 2002, <http://web.lexis-nexis.com>.

12 June 2002

G-8 foreign ministers meeting in Whistler, Canada warn that there will no let up in international diplomatic pressure on India and Pakistan to ensure that the simmering crisis in South Asia does not escalate into a nuclear war.

—"G8 vows to keep up pressure over South Asia crisis," AFP, 13 June 2002; in Lexis-Nexis Academic Universe, 13 June 2002, <http://web.lexis-nexis.com>.

12 June 2002

Reacting to Western advisories asking non-essential citizens to leave India in view of the heightened risk of a war in South Asia, India's Minister of State for Defense U.V. Krishna Raju complains that the international community was overreacting and sending out wrong signals. Raju claims that "there is no chance of a nuclear war in the subcontinent...on the contrary the signs of a conflict are diminishing."

—"West overreacting to events in subcontinent: Raju," Press Trust of India, 12 June 2002; in Lexis-Nexis Academic Universe, 12 June 2002, <http://web.lexis-nexis.com>.

6 June 2002

US President George Bush telephones Indian and Pakistani leaders and urges them to take steps to reduce the risk of war. White House spokesman Ari Fleischer says, "The president reiterated to President Musharraf that the United States expects Pakistan to live up the commitment to end all support for terrorism. The president emphasized to Prime Minister Vajpayee the need for India to respond with de-escalatory steps. To both leaders, the president stressed the need to choose the path of diplomacy." The president's calls to the two leaders come ahead of the US Deputy Secretary of State Richard Armitage's scheduled meetings with Musharraf and Vajpayee. The US State Department has also issue new travel warnings to all Americans in India and Pakistan, citing tensions at "serious levels."

—Michael Dorgan and Ken Moritsugu, "Bush makes personal plea to India, Pakistan to 'reduce risk of war'," Knight Ridder/Tribune News Service, 6 June 2002; in Lexis-Nexis Academic Universe, 6 June 2002, <http://web.lexis-nexis.com>.

6 June 2002

Bharatiya Janata Party President Jana Krishnamurthy denies that the threat of nuclear war prevented India from taking action against Pakistan. He reiterates India's commitment to a no-first-use policy and adds, "I believe in the present scenario it is not possible to use nuclear weapons Even Pakistan President Pervez Musharraf 15 days ago was threatening to use nuclear weapons but after international pressure he said he will not use them."

—"Nuclear War Not Possible: Jana," Press Trust of India, 6 June 2002; in Lexis-Nexis Academic Universe, 6 June 2002, <http://web.lexis-nexis.com>.

5 June 2002

Pakistani military envoy General Jehangir Karamat tells Italian newspaper *La Stampa* that Pakistan reserves the

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right to use nuclear weapons against India in an extreme case. Since the Indian army outnumbers the Pakistani Army five to one, "In an emergency, it is our survival that could be placed in jeopardy ... Our position is not to use them because it would be irresponsible, but rather to be ready," says Karamat.

—"Pakistan Reserves the Right to Use Nuclear Weapons Against India," Agence France Presse, 5 June 2002; in Lexis-Nexis Academic Universe, 6 June 2002, <http://web.lexis-nexis.com>.

4 June 2002

At a news conference at Almaty, Kazakhstan, Pakistani President Pervez Musharraf says "the possession of nuclear weapons by any state obviously implies that they will be used under some circumstances." He also claims that "never in the history of Pakistan has the nuclear arsenal ever been deployed, never had even the missiles been deployed."

—Laurinda Keys, "Pakistan explains nuclear policy," AP, 4 June 2004; in Lexis-Nexis Academic World, 5 June 2002, <http://web.lexis-nexis.com>.

3 June 2002

Indian Defense Minister George Fernandes downplays fears of a nuclear war in South Asia and says that neither India nor Pakistan is "imprudent" enough to use nuclear weapons. "I think it should be accepted that in South Asia there are responsible leaders. They may be belligerent and not fulfill their promises. But on nuclear matters, the subcontinent is alive to the implications," says Fernandes. However he warns Pakistani President Musharraf that if he and other Pakistani leaders decide to use nuclear weapons, India can survive a nuclear attack, "but Pakistan cannot."

—"Indian defense minister dismisses nuclear war fears," AFP, 3 June 2002; in Lexis-Nexis Academic Universe, 3 June 2002, <http://web.lexis-nexis.com>.

2 June 2002

Indian Defense Minister George Fernandes welcomes Pakistani President Pervez Musharraf's comments rejecting the likelihood of a nuclear war in South Asia. Fernandes says, "the fact that from his earlier declarations of using the nuclear options, he has now said that it is only insane minds that could think of it is a great development and should be welcomed."

—"India defense head hails Musharraf's rejection of nuclear war," 2 June 2002, Japan Economic Newswire; in Lexis-Nexis Academic Universe, 2 June 2002, <http://web.lexis-nexis.com>.

2 June 2002

Indian Defense Secretary Yogendra Narain warns that India will retaliate with nuclear weapons if Pakistan uses such weapons against India and that both countries must be prepared for mutual destruction. Narain also hints that India's nuclear weapons are ready for use and says, "everything is finalized. It is in the hands of the civilian government and we don't expect any delay in issuing orders."

—"India will use nuclear weapons if Pakistan does - defense official," 2 June 2002, AFX News Limited; in Lexis-Nexis Academic Universe, 3 June 2002, <http://web.lexis-nexis.com>.

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1 June 2002

France joins Britain, Australia, New Zealand, Canada and the United States in advising its citizens "whose presence is not indispensable in India," to leave the country due to heightened fears of a war on the subcontinent.

—"France joins growing list of nations recommending citizens leave India," Associated Press, 1 June 2002; in Lexis-Nexis Academic Universe, 2 June 2002, <http://web.lexis-nexis.com>.

1 June 2001

Pakistani President Pervez Musharraf downplays the likelihood of a nuclear war in South Asia. Musharraf tells CNN that allegations that Pakistan had moved its nuclear missiles close to the Indo-Pakistani border are "absolutely baseless...if India has moved their missiles this is extremely dangerous and a very serious escalation." On the issue of a nuclear war, Musharraf insists that he doesn't think "either side is that irresponsible...I would even go to the extent of saying one shouldn't be discussing these things, because any sane individual cannot even think of going into this unconventional war, whatever the pressures.

—"Musharraf dismisses allegations of nuke missiles movement," Press Trust of India, 1 June 2002; in Lexis-Nexis Academic Universe, 2 June 2002, <http://web.lexis-nexis.com>.

1 June 2001

The Canadian government advises families of the members of Canada's diplomatic mission in New Delhi to leave India due to increased fears of a war between India and Pakistan. The Canadian government believes that there are an estimated 6,000 Canadian citizens in India.

—"Canadians told to leave India," Xinhua General News Service, 1 June 2002; in Lexis-Nexis Academic Universe, 2 June 2002, <http://web.lexis-nexis.com>.

30 May 2001

Jane's defense estimates that India probably has 50-150 nuclear warheads and that it may be able to deploy a 20kt device from a MiG, Jaguar or Mirage aircraft. Additional analysis suggests that there is also sufficient weapons-grade plutonium and uranium available in India to build more warheads.

—"Indian nuke arsenal dwarfs Pakistan's: Jane's," Agence France Presse, 30 May 2002; in Lexis-Nexis Academic Universe, 31 May 2001, <http://web.lexis-nexis.com>.

30 May 2002

Pakistan threatens nuclear use in the event of a conventional war with India. Its representative to the United Nations Munir Akram says, "India should not have the license to kill with conventional weapons while Pakistan's hands are tied regarding other means to defend itself."

—"Defiant Pakistan threatens nuclear use," Press Trust of India, 30 May 2002, 30 May 2002; in Lexis-Nexis Academic Universe, 30 May 2002, <http://web.lexis-nexis.com>.

29 May 2002

Scientists at the Department of Atomic Energy's Saha Institute of Nuclear Physics claim that they have achieved purification of helium gas to almost 100 percent for use in cryogenic and nuclear reactor technologies. This achievement will enable India to reduce its dependence upon the United States from where the gas is currently

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imported.

—"India comes closer to self-sufficiency in helium gas," Press Trust of India, 29 May 2002; in Lexis-Nexis Academic Universe, 29 May 2002, <http://web.lexis-nexis.com>.

28 May 2002

India's Foreign Minister Jaswant Singh reiterates India's "no-first-use" of nuclear weapons policy. "India's policy has been clear and unambiguous - no-first-use of nuclear weapons," says Singh. Commenting on the Pakistani government's warnings concerning a potential nuclear war, Singh says, "...in this we see an example of nuclear terrorism."

—"India will not use nuclear weapons first: Singh," Japan Economic Newswire, 28 May 2002; in Lexis-Nexis Academic Universe, 28 May 2002, <http://web.lexis-nexis.com>.

27 May 2002

The Bhabha Atomic Research Center (BARC) claims that it has developed a miniature underwater radiation resistant camera required to inspect nuclear power plants' components. The camera can be loaded into coolant channels of pressurized heavy water reactors using existing fueling machines and is especially designed for inspection purposes. The components of the camera can withstand pressures up to 10kg/sq cm and an integrated radiation dose of 100 Mega Rads. BARC spokesperson Dr. A. P. Jayaram boasts that the development of the camera has "...resulted in self-reliance in high-tech area with substantial cost savings."

—"BARC develops MURRCCTV for in-service inspection of n-plants," Press Trust of India, 27 May 2002; in Lexis-Nexis Academic Universe, 27 May 2002, <http://web.lexis-nexis.com>.

27 May 2002

Russian Deputy Foreign Minister Georgy Mamedov urges India and Pakistan to sign the Comprehensive Test Ban Treaty (CTBT).

—"Russia urges India, Pakistan to sign nuclear test ban treaty," Associated Press, 27 May 2002; in Lexis-Nexis Academic Universe, 28 May 2002, <http://web.lexis-nexis.com>.

7 April 2002

Pakistan will use nuclear weapons against India, but only if the country is "danger of vanishing off the map," says President Pervez Musharraf. He adds, "the use of nuclear weapons is only the last resort for us. We are acting responsibly...and I am optimistic and self-confident enough to believe that we can also defend ourselves conventionally."

—"Pakistani leader says use of nuclear weapons against India would be "last resort," Associated Press, 7 April 2002; in Lexis-Nexis Academic Universe, 8 April 2002, <http://web.lexis-nexis.com>.

3 April 2002

India's Nuclear Power Corporation of India plans to extend the life of unit 1 of the Rajasthan Atomic Power Station (RAPS) by three and possibly 20 years. The reactor was earlier expected to be decommissioned in 2002. The life of RAPS-1 will initially be extended for three years by replacing a few most troublesome channels. In addition a small refueling facility will be added at a cost of 3.5-4 billion rupees. The new facility will use the steam generators and

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pumps currently in use at the existing RAPS-1 facility.

—"Indian nuclear corp plans to revive atomic plant," Press Trust of India, 3 April 2002; in Lexis-Nexis Academic Universe, 3 April 2002, <http://web.lexis-nexis.com>.

2 April 2002

The Chairman of India's Atomic Energy Commission discloses that the Department of Atomic Energy is revising the security provisions around the major nuclear power plants in the country. In this regard the Chairman and Managing Director of the Nuclear Power Corporation of India Limited says, "We have to be vigilant on both land and sea routes." But on a more reassuring note he says that the power reactors have a double containment dome and would only suffer marginal damage if an object weighing more than 50-tons crashed onto any of them at a speed of nearly 700km/hr.

—"Major security revision in nuclear power plants," Press Trust of India, 2 April 2002; in Lexis-Nexis Academic Universe, 2 April 2002, <http://web.lexis-nexis.com>.

1 April 2002

In the wake of the "first concrete pouring" of the 1,000MW Kudankulam nuclear power reactor, Russia's Deputy Minister of Atomic Energy E.A. Reshetnikov states that Russia is interested in setting up at least four more advanced light-water nuclear power reactors in India. "Since India is our strategic partner, cooperation between the two countries in nuclear energy sector will be mutually beneficial in the coming years," says Reshetnikov. Reacting to Reshetnikov's statement, India's Atomic Energy Commission Chairman Anil Kakodkar says that "we need to reach a target of 11,000MW by 2001 for which we have to add at least 4,000MW from 2004 onwards." In this regard, the Managing Director of India's Nuclear Power Corporation adds that "if Russia is able to provide us with two 1,000MW reactors each at a reasonable techno-commercial cost within the stipulated time, we welcome it." Otherwise India will pursue indigenous nuclear power programs to reach that target.

—"Russia keen on setting up at least 4 more nuclear reactors," Press Trust of India, 1 April 2002; in Lexis-Nexis Academic Universe, 1 April 2002, <http://web.lexis-nexis.com>; "Reacting to Reshetnikov's statement, Atomic Energy," Press Trust of India, 1 April 2002; in Lexis-Nexis Academic Universe, 1 April 2002.

29 March 2002

Indian nuclear scientists refute the U.S. Energy Department's concern about the few grams of unaccounted radioactive plutonium provided to India under the 1954 Atoms for Peace program. Dr. Anil Kakodkar, the Chairman of the Indian Atomic Energy Commission, states, "the amount of plutonium supplied in [the] mid-50s by U.S. for research purpose was insignificantly small compared to the size of plutonium stockpile India is handling today as our programme is much bigger and the infrastructure is designed to manage large quantities." Former Chairman of the Indian Atomic Energy Commission Dr. P. K. Iyengar agrees, saying "this small quantity has no weapon relevance and there was no need to get panicky."

—"Few Grams of Plutonium from US is Safe, Need Not Cause Concern," Press Trust of India, 29 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

27 March 2002

The Russian Consulate General in Mumbai reports that the new Indian nuclear power station Kudankulam in the

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southern state of Tamil Nadu will operate under IAEA safeguards.

—"IAEA to be Monitoring New Indian Nuclear Power Station," RIA-Novosti, 27 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

26 March 2002

The U.S. Energy Department Inspector General Gregory H. Friedman releases a report saying that plutonium capsules provided to India by the United States are enough to create a "dirty bomb". Small amounts of plutonium packed in sealed capsules were provided to 33 countries, including India, under the 1954 Atoms for Peace program until the late 1970s. The report says "it has inconsistent historical data regarding the [present] ownership of the material." Friedman continues, "In the wrong hands, these sources could be misused."

—"Plutonium: Unaccounted Capsules Enough to Create 'Dirty Bomb'," *Greenwire*, 27 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

26 March 2002

Janes Defence Weekly publication reports that the Indian Air Forces is planning to acquire 126 Mirage 2000-5s to equip seven squadrons that will comprise the backbone of India's proposed strategic nuclear deterrent.

—"India to Buy Over 100 Dassault Aviation Mirage Fighter Jets - Report," AFX European Focus, 26 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

18 March 2002

Janes Intelligence Review reports that Pakistan has edged past India in nuclear weapons capability since the two countries conducted nuclear tests in May 1998. Janes Intelligence Review suggests that India has moved at a slower pace in deciding and completing delivery systems, evolving procedures, tactics and doctrine for nuclear use as well as for ensuring effective control over nuclear forces. The publication explains that "India views nuclear weapons as necessary for their political utility; their ability to bring international prestige and provide deterrence vis-à-vis Pakistan and China," whereas Pakistan's nuclear forces are controlled by the army and are more fully incorporated into the country's overall military strategy.

—"Pak Moving Ahead of India in Nuke Capability," The Press Trust of India, 25 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

15 March 2002

India completes its requirements for accession to the Convention on the Physical Protection of Nuclear Material.

—"India Strengthens its Commitment to Fight Against Terrorism," The Press Trust of India, 15 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

12 March 2002

Indian Foreign Minister Jaswant Singh says that there is a "new urgency" for the abolition of nuclear weapons in order to prevent them from falling into the clutches of terrorist groups. Singh is reported as stating that the abolition of nuclear weapons through "a multilaterally agreed, legally-binding undertaking...has taken on a new urgency with the current rise of non-state actors as powerful military threats."

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—"India Sees 'New Urgency' for Abolition of Nuclear Weapons," Agence France Presse, 12 March 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

12 February 2002

Russian and Indian energy officials sign a 1.5 billion dollar contract for the delivery of two Russian reactors for a new Indian nuclear power plant. The two 1,000-megawatt reactors are to be delivered to southern India's Kudankulam nuclear power plant within the next five years, according to Russian Deputy Energy Minister Yevgeny Reshetnikov.

—"Russian and India Ink 1.5-Billion-Dollar Nuclear Reactor Deal," Agence France Presse, 12 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

12 February 2002

Pakistani President Pervez Musharraf says that he believes that India may conduct another nuclear test in the near future. He states, "There are some indicators that the Indians are thinking of doing another nuclear test. We have shared our information with the U.S. leadership." On 13 February 2002, Indian Prime Minister Atal Behari Vajpayee refutes this claim, calling it "old tactics of Pakistan to mislead the world community." Indian Foreign Ministry spokeswoman Nirupama Rao says, "We have rejected the allegation as absolutely false, totally baseless and this is obviously the season for kite-flying in Pakistan. We have seen a number of such false allegations made (by Pakistan) in recent days and we reject them in their entirety and they can best be described as timed-release capsules of diversionary propaganda."

—"Musharraf: India May Test Nuke Again," United Press International, 12 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com, "India Rejects Pakistan Allegations of Fresh Nuclear Test," Agence France Presse, 13 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

8 February 2002

India and Russia fail to reach an agreement on the lease of India of two Russian nuclear submarines and on the Russian aircraft carrier Admiral Gorshkov, which New Delhi had wanted to buy at the price of about 1 billion U.S. dollars. Indian Defense Minister George Fernandes confirms, "There is no (deal on) nuclear submarine." However, Russian media suggests that the deal may still be possible, saying, "If the proposed lease of four Tu-22M3 strategic bombers and two Akula class nuclear-propelled assault submarines of Project-971 goes through, then India will not only become a full-fledged nuclear power, but also the mightiest nation in the region."

—"Indian, Russia Sign Protocols on Military Cooperation," Xinhua News Agency, 8 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com, "Indo-Russian Deal Can Make India Nuke Power," The Press Trust of India, 9 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

6 February 2002

U.S. Central Intelligence Agency (CIA) director George Tenet testifies about the South Asia nuclear crisis before the U.S. Senate Intelligence Committee. He tells the Committee that "the chance of war between these two nuclear-armed states [India and Pakistan] is higher than at any point since 1971." He continues, "Both India and Pakistan are publicly downplaying the risks of nuclear conflict in the current crisis. We are concerned, however, that a

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conventional war - once begun - could escalate into a nuclear confrontation," and "If India were to conduct large-scale offensive operations into Pakistani Kashmir, Pakistan might retaliate with strikes of its own in the belief that its nuclear deterrent would limit the scope of an Indian counterattack."

—"Annan Offers UN Help to India, Pak to Resume Dialogue," The Press Trust of India, 7 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

6 February 2002

The Indian Express newspaper reports that India's Atomic Energy Commission is seeking 'no-fly zones' over nuclear installations to prevent terrorist attacks from the air. An official from the Commission says that were the entire area over nuclear installations was declared a no-fly zone, then "any flying object would be easily identifiable as friend or foe." Contemporaneously, security at India's nuclear installations is improved, as the Indian Coast Guard places additional boats off the coast of Bombay to guard the Bhabha Atomic Research Center. Also, an Indian Defense Ministry official says that a requisition for additional anti-aircraft guns has been made for deployment to the Narora Atomic Power plant in Rajasthan and for two atomic power plants in southern India.

—"Indian Atomic Energy Body Wants 'No Fly Zones' Over Nuke Facilities," Deutsche Presse-Agentur, 5 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

6 February 2002

According to a report released by Italian nuclear physicists, Pakistan's "nuclear weapons are aimed solely at India". Also, Pakistan will use these weapons only if India crosses the "space threshold" - if India conquers a large part of Pakistani territory; and the "military threshold" - if India destroys a large part of Pakistan's land or air forces. Further, Pakistan may use nuclear weapons if India pushes Pakistan into "political destabilization or creates a large scale internal subversion."

—Iqbal Nadeem. "Economic Threat May Push Pakistan to Nukes" IPS-Inter Press Service, 4 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

6 February 2002

Russian Deputy Prime Minister Ilya Klebanov arrives in India to sign a defense protocol paving the way for leasing two long-range nuclear submarines and two TU-22 long-range bombers to the Indian Navy. The agreement is also likely to advance an agreement between India and Russia on India's acquisition of the 44,000 ton Kiev Class Aircraft carrier "Admiral Gorshkov", and Russia is likely to offer India a stake in the joint development of futuristic armament systems. The meeting takes place on 6 February 2002 as part of the two-year old Indo-Russia Inter-Governmental Commission on Military-Technical Co-operation.

—"India, Russia to Sign Defense Protocol During Klebanov's Visit," The Press Trust of India, 4 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com; "Russia to Offer India Stake in Developing New Weapons," The Press Trust of India, 4 February 2002, in Lexis-Nexis Academic Universe, 13 February 2005, www.lexis-nexis.com.

31 January 2002

In an interview to the U.S. Information Service, U.S. Assistant Secretary of State for Non-Proliferation makes a series of comments about India and Pakistan. He states, "India and Pakistan have to understand that a race for

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building more missiles and better nuclear weapons is not the real answer to a stable equilibrium in South Asia. They have to deal with their problems on a political level. That is what we hope will happen." In response to a question regarding Indian and Pakistani nuclear ambitions, Wolf says, "They have these weapons and we have to deal with it, but we still have a series of concerns about nuclear weapons, their delivery capabilities and the risks of proliferation in South Asia."

—"Indo-Pak Tension May Lead To Nuclear Proliferation In S Asia," The Press Trust of India, 31 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

27 January 2002

India's National Disaster Management Committee Vice Chairman Sharad Pawar announces that the Indian national disaster management policy will deal with probably crisis situations in the event of nuclear and terrorist strikes, as well as from other catastrophic events. While refusing to divulge details on the nuclear crisis management mechanism, he does mention, "I can only say that I have visited Japan in this connection," and that the mechanism to manage nuclear fallout is likely to ensure a specific role for the military and scientific establishments.

—"Disaster Management Plan to Deal With Nuclear Crisis," The Press Trust of India, 27 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

25 January 2002

Indian army chief S. Padmanabhan states that his force is "fully ready" for war. He warns that although "nuclear weapons are not meant for war fighting," India would severely punish any state that is "mad enough to use nuclear weapons against any of our assets. The perpetrator shall be so severely punished that his very existence will be in doubt. We are ready for a second strike."

—Bidwai, Praful. "India Sharpens Its Nuclear Claws," IPS-Inter Press Service, 29 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com.

25 January 2002

The Indian government rejects a Pakistani call to de-nuclearize South Asia, stating, "Nuclear weapons should be banished from the entire globe. De-nuclearization of India and Pakistan will have no meaning."

—"Pakistan Regrets India's Rejection of Talks but Offer There," Deutsche Presse-Agentur, 29 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com; Bidwai, Praful. "India Sharpens Its Nuclear Claws," IPS-Inter Press Service, 29 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com.

24 January 2002

The former Principal Scientific Advisor to the Indian government Dr. A. P. J. Abdul Kalam states that India has the capability to retaliate with "multiple effect" if attacked with nuclear weapons. He also affirms that India has adopted "the no-first use philosophy." He adds, "But, India can and has the capability to retaliate with multiple effect."

—"India Capable to Retaliate with Multiple Effect: Kalam," The Press Trust of India, 25 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

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23 January 2002

Pakistani President Pervez Musharraf proposes the de-nuclearization of South Asia and a 'No War Pact' with India as a means to avoid a nuclear exchange between the two neighbors. However, he declines to reciprocate India's 'No-First-Use' of Nuclear Weapons Pledge, saying, "Why should we be accepting what they (the Indians) say? Why don't they accept what we are saying? We want to de-nuclearize South Asia. We want to sign a 'No War Pact' with them. Isn't that better? I think the world community should insist on that. Pakistan is offering a much bigger deal." —"Pak Ready for Denuclearization of S Asia, Sign No War Pact," The Press Trust of India, 23 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

23 January 2002

Indian Ambassador to Russia Krishan Raghunath states that India "will not be the first to use nuclear weapons. He also emphasizes that Indian nuclear weapons are under the strict control of the government." —"Indian Ambassador to Russia States That India Will Not Be The First To Use Nuclear Weapons Under Any Circumstances," RIA Novosti, 23 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

22 January 2002

The Indian Foreign Ministry releases a statement explaining that India has decided to adopt an international convention on protection against theft or unauthorized diversion of nuclear material. The 1980 "Convention on the Physical Protection of Nuclear Material" obliges member states to ensure physical protection of nuclear material during international transport. India is the 71st signatory to the convention. The statement reads, "In recent years, this (terrorist) threat has been compounded by fears of nuclear terrorism. Therefore, accession to this convention has become an important step in the fight against terrorism." —"India to Adopt Convention on Physical Protection of Nuclear Material," Associated Press Worldstream, 22 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

21 January 2002

The United State Central Intelligence Agency (CIA) releases a report on "Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Weapons. The report covers India's nuclear weapons program in-depth, stating, "The acquisition of foreign equipment will benefit New Delhi in its efforts to develop and produce more sophisticated nuclear weapons." The report continues, "India continues to rely on foreign assistance for key missile technologies, where it lacks engineering or production expertise. Entities in Russia and Western Europe remained the primary conduits of missile-related and dual-use technology transfers during the first half of 2001." The report is released semi-annually to the U.S. Congress. --"India Continues N-Arms Programme With Foreign Aid: CIA," Press Trust of India, 31 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

16 January 2002

Indian naval chief Admiral Madhvendra Singh refuses to confirm or deny whether the Indian Navy's warships are armed with nuclear weapons. However, he does say, "Conceptually any country which assures of 'no first use' has a second strike capability and would always have a triad of weapons on land, air, and at sea." He also adds that for

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most nuclear capable countries, the most potent strike force is "hidden, moving, and underwater." Moreover, he states, "the Indian Navy has the assured capability to cause such damages to the other side which the opposition would never have imagined.

—"Indian Armed Forces Fully Mobilized: Naval Chief," Agence France Presse -- English, 16 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com; "India, France to Sign Accord for Production of Submarines," Deutsche Presse-Agentur, 19 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com.

14 January 2002

Indian Defense Minister George Fernandes states that India views "a nuclear weapon as a deterrent and nothing beyond that." He also says, "I have always held that no sensible person would like to even think of using a nuclear weapon."

—"'"No Sensible Person' Would Use Nuclear Weapons: Indian Minister," Agence France Presse -- English, 14 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com.

7 January 2002

Indian Defense Minister George Fernandes rules out the possibility of India reviewing its nuclear doctrine of "no first use" in the wake of 13 December 2001 terrorist attacks on India's parliament building. He states, "It (the doctrine) remains. It does not change."

—"India Sticks to No-First Use on Nuke Weapon," The Press Trust of India, 7 January 2002, in Lexis-Nexis Academic Universe, 12 February 2005, www.lexis-nexis.com.

1 January 2002

Despite current military tensions, India and Pakistan exchange information on their nuclear installations and facilities. The exchange is mandated under an agreement banning attacks on each other's nuclear installations and facilities. The countries are required to exchange information on the first working day of every year.

—"Pakistan, India Exchange Nuclear Information Despite Tensions," Agence France Presse, 1 January 2002, in Lexis-Nexis Academic Universe, 2 February 2005, www.lexis-nexis.com.

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2001

26 December 2001

In the midst of revived Indo-Pakistani military and political tensions, and military build-up along the border, Indian Defense Minister announces that India's "guided missiles are in position." However, Fernandes does not specify which missiles have been deployed.

—"Indian missiles are "in position": defense minister," Agence France Presse, 26 December 2001; in Lexis-Nexis Academic Universe, 25 December 2001, <http://web.lexis-nexis.com>.

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8 December 2001

Dr. B. Bhattacharjee, managing director of the Bhabha Atomic Research Center (BARC) claims Indian nuclear plants have the best safety record in the world; and that the International Atomic Energy Agency (IAEA) has recognized that fact.

—"Safety record of Indian nuke plants best, says BARC MD," Press Trust of India, 8 December 2001; in Lexis-Nexis Academic Universe, 12 December 2001, <http://web.lexis-nexis.com>.

5 December 2001

The Bhabha Atomic Research Center (BARC) discloses that it has developed a device that can detect the unauthorized movement and transportation of special nuclear materials. The device not only detects special nuclear materials, but also raises an alarm. It will be useful in combating nuclear terrorism.

—"BARC develops device helpful in combating nuclear terrorism," Press Trust of India, 5 December 2001; in Lexis-Nexis Academic Universe, 5 December 2001, <http://web.lexis-nexis.com>.

3 December 2001

India and the United States resume military-to-military cooperation and revive the Defense Policy Group (DPG), which was suspended in the wake of India's May 1998 nuclear tests. As part of the revival process, U.S. Undersecretary for Defense Douglas Feith and Indian Defense Secretary Yogendra Narain meet in New Delhi. India is seeking conventional weapons technology from the United States. The United States has also indicated that Indian requests for dual-use technologies will be considered on a case-by-case basis.

—"India, US revive Defense Policy Group," Press Trust of India, 3 December 2001; in Lexis-Nexis Academic Universe, 3 December 2001, <http://web.lexis-nexis.com>.

24 November 2001

The *Statesman* reports that the Indian government is concerned about the safety and security of Pakistan's nuclear weapons stockpile. The government believes that Pakistani nuclear weapons are stored at Kahuta and Belali near the Afghan border; and some devices were apparently recently moved to Gilgit where the Pakistani government has excavated a mountain to store the weapons. Belali is very close to the Afghan border and in view of the turmoil in Afghanistan there are concerns within the Indian government that the weapons could fall into the hands of the Taliban and Osama Bin Laden. The Indian government recently appraised the United States and Britain of its concerns and has initiated a series of precautionary measures in the last few weeks to enhance India's security.

—"Pak nukes kept near Afghan border," *Statesman*, 24 November 2001; in Lexis-Nexis Academic Universe, 24 November 2001, <http://web.lexis-nexis.com>.

21 November 2001

In a statement before the two houses of parliament concerning his recent trips to Russia and the United States, Prime Minister Vajpayee states that India and the United States have agreed to stimulate bilateral high-technology commerce and to streamline procedures for transfer of dual-use technology and military items. The United States and India will also initiate discussions on cooperation in space programs and civilian nuclear safety projects.

—"Indo-US talks on n-safety soon: PM," *Hindu*, 21 November 2001; in Lexis-Nexis Academic Universe, 21 November 2001, <http://web.lexis-nexis.com>.

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16 November 2001

The Indian government's newly appointed principal scientific advisor asserts that the nuclear tests conducted at Pokhran in May 1998 were "eminently successful." He also rules out a review of the Indian government's moratorium on further nuclear testing. Commenting on the doubts expressed in the United States and other Western countries about the success of the Indian tests Chidambaram states, "some Americans may doubt India's achievement. But there are also some others who agreed with us."

—"No review of n-weapons policy: Chidambaram," *Hindu*, 16 November 2001; in Lexis-Nexis Academic Universe, 19 November 2001, <http://web.lexis-nexis.com>.

15 November 2001

Principal Scientific Advisor to the Indian government Dr. R. Chidambaram dismisses fears that non-state actors such as Osama Bin Laden might have developed nuclear weapons. "The development of nuclear weapons is not an easy task. Projects to design and maintain such weapons lie with nation states."

—"India's nuclear boss dismisses bin Laden's nuclear threats," *Agence France Presse*, 15 November 2001; in Lexis-Nexis Academic Universe, 15 November 2001, <http://web.lexis-nexis.com>.

14 November 2001

An Indian intelligence officer suggests that Pakistan may have relocated parts of its nuclear arsenal to Gilgit. On September 13, 2001, 36 hours after the attacks on the World Trade Center in New York, Indian intelligence tracked the flight of a C-130 Hercules transport with a heavy escort of F-16 combat aircraft. In light of this puzzling movement, Indian intelligence agencies speculate that the act was likely part of an attempt by the Pakistani military to disperse its nuclear arsenal.

—Manoj Joshi, "Pak may have relocated nukes to Gilgit," *Times of India*, 14 November 2001; in Lexis-Nexis Academic Universe, 14 November 2001, <http://web.lexis-nexis.com>.

12 November 2001

The Indian government's retiring chief scientific advisor Dr. A.P.J. Abdul Kalam says that India's nuclear arsenal is safe and the country has better safety standards than many other countries. "Safety standards are in-built in our country. We possibly have much better safety standards than many others. These standards are absolutely safe," says Kalam. He reiterates that India possesses both fission and fusion bombs and these weapons are for deployment. In a further attempt to defuse the controversy concerning the success of India's hydrogen bomb test, Kalam insists that despite existing doubts on the part of external powers such as the United States and Russia on whether India possessed a hydrogen bomb, India was satisfied with the nuclear tests it carried out in May 1998.

—"India's Kalam says nuclear arsenal absolutely safe," *AFX Asia*, 12 November 2001; in Lexis-Nexis Academic Universe, 13 November 2001, <http://web.lexis-nexis.com>; "India possesses nukes for deployment: Kalam," *Press Trust of India*, 12 November 2001; in Lexis-Nexis Academic Universe, 12 November 2001, <http://web.lexis-nexis.com>.

11 November 2001

In the wake of Prime Minister Vajpayee's meetings with U.S. President George Bush, India and the United States agree to establish a "new strategic framework dialogue" to expand cooperation in the civilian space sector, nuclear

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safety, and high-technology trade. In addition, the United States will also hold enhanced consultations with India on the issues of missile defense and strengthening export controls.

—"India, US for 'new strategic framework dialogue', *Hindu*, 11 November 2001; in Lexis-Nexis Academic Universe, 14 November 2001, <http://web.lexis-nexis.com>.

11 November 2001

Pakistani President Pervez Musharraf proposes a bilateral treaty with India to ban further nuclear tests. He makes his proposal in an address to the UN General Assembly. "We are ready to formalize a bilateral treaty with India for a mutual test ban. We are ready to discuss nuclear and missile restraints as well as nuclear risk reduction measures with India in a structured, comprehensive and integrated dialogue," says Musharraf.

—"Musharraf proposes treaty with India on nuke test ban," Press Trust of India, 11 November 2001; in Lexis-Nexis Academic Universe, 12 November 2001, <http://web.lexis-nexis.com>.

10 November 2001

India and the United States agree to open talks on the transfer of dual-use and military items. In this context, Indian Foreign Minister Jaswant Singh remarks that he believes that U.S. restrictions on military supplies to India will be lifted following Prime Minister Vajpayee's successful meeting with U.S. President George Bush. However, with regards to nuclear energy, India will receive U.S. cooperation in the area of nuclear safety.

—"Indian FM says US military sanctions likely to end," Agence France Presse, 10 November 2001; in Lexis-Nexis Academic Universe, 10 November 2001; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "India, US to hold talks on transfer of dual-use, military items," Press Trust of India, 10 November 2001; in Lexis-Nexis Academic Universe, 12 November 2001, <http://web.lexis-nexis.com>.

10 November 2001

Dr. R. Chidambaram, former Chairman of the Atomic Energy Commission is appointed as the Principal Scientific Advisor to the Government of India. Chidambaram succeeds Dr. A.P.J. Abdul Kalam.

—"India appoints nuclear test planner as principal scientific advisor," Agence France Presse, 10 November 2001; in Lexis-Nexis Academic Universe, 10 November 2001, <http://web.lexis-nexis.com>.

9 November 2001

V.K. Chaturvedi, the Chairman of Nuclear Power Corporation of India Ltd. announces that construction of the Russian light-water reactors at Koodankulam will begin in April 2002.

—"Construction of Kudankulam nuke plant to begin next year," Press Trust of India, 9 November 2001; in Lexis-Nexis Academic Universe, 9 November 2001, <http://web.lexis-nexis.com>.

7 November 2001

An Indian Defense Ministry spokesperson says that the United States has agreed to supply "specific items of defense needs" after a visit by U.S. Defense Secretary Donald Rumsfeld to New Delhi.

—"Washington lifts Indian arms ban," *The Australian*, 7 November 2001; in Lexis-Nexis Academic Universe; in Lexis-Nexis Academic Universe, 6 November 2001, <http://web.lexis-nexis.com>.

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7 November 2001

India's Atomic Energy Regulatory Board (AERB) begins a comprehensive safety review of the two VVER-1000 light-water reactors that Russia will build in India.

—"AERB begins safety review of Russian reactors," Press Trust of India, 7 November 2001; in Lexis-Nexis Academic Universe, 7 November 2001, <http://web.lexis-nexis.com>.

6 November 2001

Prime Minister Vajpayee visits Moscow. During his visit, India and Russia sign a Memorandum of Understanding for the construction of the Koodankulam nuclear power plant.

—"Russia and India sign a memorandum on construction of nuclear power plant," RIA Novosti, 6 November 2001; in Lexis-Nexis Academic Universe, 28 June 2004, <http://web.lexis.com>.

3 November 2001

India's cabinet approves the 2,000MW Koodankulam nuclear power plant project, which is to be constructed with Russian financial and technical assistance.

—"India's cabinet approves construction of nuclear power plant with help from Russia," Associated Press, 3 November 2001; in Lexis-Nexis Academic Universe, 4 November 2001, <http://web.lexis-nexis.com>.

30 October 2001

India's Defense Minister George Fernandes downplays international concerns that Pakistani nuclear weapons might fall into the hands of terrorists. In an address to a seminar on the 'global threat of terror' Fernandes says that those responsible for the safety and security of Pakistan's nuclear forces "know how to keep the assets safely."

—"Terror-Fernandes-Nukes," Press Trust of India, 30 October 2001; in Lexis-Nexis Academic Universe, 30 October 2001, <http://web.lexis-nexis.com>.

27 October 2001

Japan lifts the economic sanctions that it imposed on India and Pakistan in the wake of their May 1998 nuclear tests. A Japanese government spokesperson explains that sanctions are being lifted because Japan "...values India and Pakistan's efforts to contribute to strengthening the international coalition against terrorism." Among other reasons, both countries had maintained "...their moratoriums on further nuclear tests for the past three years. Furthermore, both countries have stated they would ensure strict controls of nuclear and missile-related goods and technologies. To that extent, Japan's measures have obtained due achievement."

—Amit Baruah, "Japan lifts sanctions against India, Pak," *Hindu*, 27 October 2001; in Lexis-Nexis Academic Universe, 7 November 2001, <http://web.lexis-nexis.com>.

19 October 2001

India dismisses Pakistan's proposal for nuclear restraint in South Asia which was made in Geneva by Pakistani Ambassador Munir Akram. The Indian External Affairs Ministry says, "...this is an old proposal which has been stated and re-stated."

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—"India brushes aside Pak ideas on nuke restraint," Press Trust of India, 19 October 2001; in Lexis-Nexis Academic Universe, 19 October 2001, <http://web.lexis.com>.

16 October 2001

Russia allegedly agrees to lease four nuclear-capable Tupolev-22 bombers to India. A lease agreement is expected to be signed by Russian Deputy Prime Minister Ilya Klebanov, who is currently visiting India.

—"Russia to provide 4 Tupolev-22 long-range bombers to India," Japan Economic Newswire, 16 October 2001; in Lexis-Nexis Academic Universe, 17 October 2001, <http://web.lexis-nexis.com>.

6 October 2001

In the wake of the terrorist attacks in New York, India's Department of Atomic Energy (DAE) requests that the civil aviation ministry ban commercial over flights over the country's nuclear facilities. The list of facilities includes the 14 nuclear power reactors, the Indira Gandhi Center for Atomic Research, the Center for Advanced Technology, the Variable Energy Cyclotron Center, the Nuclear Fuel Complex, the eight heavy water plants, and the uranium mines at Jaduguda. However, the Directorate General of Civil Aviation indicates that the Aviation Ministry has not yet forwarded the request to its office.

—Srinivas Laxman, "DAE seeks ban on overflights over nuclear establishment," *Times of India*, 6 October 2001; in Lexis-Nexis Academic Universe, 6 October 2001, <http://web.lexis-nexis.com>.

1 October 2001

The U.S. Department of Commerce further pares down the list of Indian companies that are prohibited from doing business with their U.S. counterparts. The new list, which has 16 entities, includes the Defense Research & Defense Organization, the Atomic Energy Commission, the Indian Space & Research Organization, the Armament Research & Development Complex, Solid State Physics Laboratory, Bhabha Atomic Research Center, Indian Rare Earths, nuclear power plants, the space organization's Telemetry, Tracking, & Command Center, inertial systems unit, Liquid Propulsion Systems Center, Solid Propellant Space Booster Plant, the Space Applications Center in Ahmedabad, Sriharikota Space Center, and the Vikram Sarabhai Space Center. The original number of entities that were sanctioned in the wake of India's May 1998 nuclear tests was 200.

—"Only 16 Indian entities in US prohibitory list," *Times of India*, 4 October 2001; in Lexis-Nexis Academic Universe, 4 October 2001, <http://web.lexis-nexis.com>.

1 October 2001

Disgruntled employees at the Nuclear Fuel Complex (NFC) tell *Times of India* of health hazards at the plant not just from radiation exposure but also from exposure to chemicals such as chlorine, ammonia, and hydrochloric and nitric acids. The chemicals are used in the conversion of zircon sand into sponge and decladding of zircaloy tubes of their copper jackets. In addition, employees complain that they are exposed to high-levels of radiation from the powerful X-Ray machines used to check zircaloy fuel tubes with uranium pellets for faults. The energy of the X-Ray machines ranges from 250kv-350kv. Plans are afoot to line the entire section where such X-Ray tests are performed with lead shields. In the interim however, the workers have not been provided with lead-clad jackets.

—P. Balu, "Corrosive acids add to NFC workers woes," *Times of India*, 1 October 2001; in Lexis-Nexis Academic Universe, 3 October 2001, <http://web.lexis-nexis.com>.

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29 September 2001

The United States clarifies that it has waived all Glenn Amendment-related sanctions that were imposed on India in the wake of its May 1998 nuclear tests.

—"US clarifies modifications in India-Pakistan sanctions," Press Trust of India, 29 September 2001; in Lexis-Nexis Academic Universe, 1 October 2001, <http://web.lexis-nexis.com>.

29 September 2001

The *Times of India* reports that the environmental fallout of the country's nuclear program is being felt by generations of tribal people at Jadugoda, Narwapahar, and Bhatin, located close to the Jadugoda uranium mines. These mines produce all the uranium used in India's pressurized heavy water reactors. About 35,000 people who live within a 5km radius of the Jadugoda complex are exposed to high-levels of radiation and radon gas inside the mines. Since their uniforms are washed at home once a week, other family members also become exposed to the radiation. On average, a worker dies within 10 years of working at the mine. Because the mined ore is carried in open trucks, radioactive ore often falls off by the wayside; in other instances, radioactive dust is carried by the wind. The tailings are also used to refill the mines; nearly 180,000 tons of tailings have been dumped in three ponds. Two of the ponds are full and have been abandoned; the third is brimming and efforts are afoot to acquire land for a fourth pond. Because the ponds are not protected by fencing, cattle and humans often wade through them. Children play on the beds and the villagers use ropes used in the mines to make beds. Villages exist in close proximity to the ponds and the ignorant villagers have used the tailings to construct houses and build roads.

—Royden D'Souza, "Jadugoda tribals live and breathe uranium," *Times of India*, 29 September 2001; in Lexis-Nexis Academic Universe, 29 September 2001, <http://web.lexis-nexis.com>.

28 September 2001

Following the lifting of sanctions imposed on India and Pakistan in the wake of their May 1998 nuclear tests, the U.S. Commerce Department announces that the United States is seeking to revise the 'Entities List' that bans the export of nuclear and missile-related dual-items to India and Pakistan. The sanctions waiver that went into effect on 23 September 2001 permits the lifting of the denial policy currently in place in the Export Administration Regulations for nuclear and missile proliferation-related items to these countries. A license will still be required to export these items to India and Pakistan. Nonetheless, the license review policy will revert to a case-by-case review.

—"US 'Entities' list being revised," Press Trust of India, 28 September 2001; in Lexis-Nexis Academic Universe, 28 September 2001, <http://web.lexis-nexis.com>.

23 September 2001

A senior employee at India's Nuclear Fuel Complex (NFC) alleges that hazardous working conditions have caused and are causing serious health hazards for employees working there. He claims that on average at least two employees die due to such hazards every month. Problems stem from the lack of adequate protection to employees who work in high-radiation zones, such as areas where uranium cake is converted to powder and then sent through chemical and mechanical processes to press the powder into pellets. If inhaled, uranium dust can lead to the hardening of the lungs and result in lung cancer or other deadly side-effects. Particles that settle on the skin also cause health hazards. Sources in NFC say that there have already been some cases in which employees

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have been diagnosed with leukemia caused by hazardous working conditions. After hospitals in Hyderabad certified that the disease in some employees was linked to the working conditions at NFC, the NFC's senior management panicked and asked the hospitals not to issue such certificates. Some other employees allege that most of the health problems among workers can be traced to a period when the NFC secretly reprocessed spent fuel to extract highly radioactive plutonium a few years ago. The workers were not told that their work involved the reprocessing of spent fuel.

—"NFC air thick with uranium dust," *Times of India*, 23 September 2001; in Lexis-Nexis Academic Universe, 23 September 2001, <http://web.lexis-nexis.com>.

23 September 2001

U.S. President George W. Bush issues an Executive Order lifting all remaining nuclear-related sanctions against India and Pakistan. A White House memorandum on the subject states the sanctions were no longer "in the national security interest of the United States." India welcomes the U.S. decision to lift economic and military sanctions that were imposed in the wake of the May 1998 nuclear tests. India's Finance Minister Yashwant Sinha says "it is a good thing that sanctions have been lifted but it's a minor issue as far as the Indian economy is concerned because sanctions would have spent themselves out...as far as the Indian economy was concerned, except for certain defense supplies, sanctions had no meaning."

—"US lifts nuclear-related sanctions against Pakistan, India," Deutsche Presse-Agentur, 23 September 2001; in Lexis-Nexis Academic Universe, 23 September 2001, <http://web.lexis-nexis.com>; Biman Mukherjee, "Indian government welcomes lifting of US sanctions," Agence France Presse, 23 September 2001; in Lexis-Nexis Academic Universe, 23 September 2001, <http://web.lexis-nexis.com>.

21 September 2001

Marc Grossman, Undersecretary of Political Affairs at the U.S. State Department, holds closed-door meetings with members of Congress and appraises them of the Bush administration's plans to lift sanctions on India and Pakistan that were imposed in the wake of the their 1998 nuclear tests.

—"Bush aides conduct classified talks with Congress on India-Pakistan sanctions," Agence France Presse, 21 September 2001; in Lexis-Nexis Academic Universe, 21 September 2001, <http://web.lexis-nexis.com>.

30 August 2001

India's Atomic Energy Commission (AEC) Chairman Dr. Anil Kakodkar denies that India made clandestine and illegal imports of nuclear pulse generators from Berkeley Electronics in the United States. Kakodkar states, "we do not believe in any clandestine procurement. All our procurement is above board...all our activities are based on our own indigenous efforts and we are not [dependent] on any outside sources."

—"No clandestine procurements: AEC chairman," Press Trust of India, 30 August 2001; in Lexis-Nexis Academic Universe, 30 August 2001, <http://web.lexis-nexis.com>.

30 August 2001

The United States and India decide to resume the bilateral military dialogue that was interrupted in the wake of U.S. sanctions imposed after India's May 1998 nuclear tests.

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—"Regular US, India military dialogue to resume," Press Trust of India, 30 August 2001; in Lexis-Nexis Academic Universe, 30 August 2001, <http://web.lexis-nexis.com>.

30 August 2001

Former Indian Prime Minister Inder Kumar Gujral addresses an international conference on the subject of denuclearization and a nuclear-free world in the 21st century. In his prepared comments, Gujral makes the case that the proponents of de-nuclearization should also pay attention to the problem of terrorism and seek ways to banish the latter phenomenon. "Even after sovereign nations have eliminated their nuclear stockpiles, can we be sure that some evil man of terror is not sitting on a nuclear warhead?" And what is particularly dangerous is that "the forces of terror do not play by the rules. By their nature they live beyond rules." However, Gujral makes a strong case for ridding the world of nuclear arsenals. He says, "if we do not act today, it may be too late tomorrow because the forces of terror are spiraling too constantly and in multiple forms." Gujral also supports the concept of a nuclear free 21st century with the caveat that "complete disarmament" and not the selective de-nuclearization was the key to ridding the world of the nuclear menace.

—"Gujral opposes selective de-nuclearization," *Hindu*, 30 August 2001; in Lexis-Nexis Academic Universe, 30 August 2001, <http://web.lexis-nexis.com>.

29 August 2001

A grand jury indicts three executives--David Brown, Richard Hamilton, and Vincent Delfino of Berkeley Electronics, a Marin County electronics firm--for illegally selling five nuclear pulse generators to India's Bhabha Atomic Research Center (BARC) and Nuclear Power Corporation between 1999 and 2000. The generators emit electrical pulses and can be used to calibrate radar and nuclear instruments with military applications. The U.S. federal government began building a case against the firm after agents of the Commerce Office of Export Enforcement posed as exporters in a sting operation.

—David Kravets, "Marin Country executives indicted in nuclear testing sale," Associated Press State & Local Wire, 29 August 2001; in Lexis-Nexis Academic Universe, 30 August 2001, <http://web.lexis-nexis.com>; "US firms indicted for nuclear sales to India," *Business Recorder*, 11 September 2001; in Lexis-Nexis Academic Universe, 11 September 2001, <http://web.lexis-nexis.com>.

28 August 2001

Indian Defense Minister Jaswant Singh reveals plans for the establishment of a joint strategic command involving the Army, Navy, Air Force, and Coast Guard on the Andaman and Nicobar islands in the Bay of Bengal. Singh informs the upper house of parliament (Rajya Sabha) that "the Joint Andaman and Nicobar Strategic Defense Command, to be established for the first time in the country, will be in place by the end of September." The new command will have a naval commander-in-chief, though subsequently the command will be headed by a suitable officer from any of the three services. Commenting on the appointment of a commander for India's nuclear forces, Singh says that "Prime Minister Vajpayee will take a decision on the issue after the consultation process is completed."

—Pratap Chakravarty, "India unveils plans for new strategic command, military revamp," Agence France Presse, 28 August 2001; in Lexis-Nexis Academic Universe, 28 August 2001, <http://web.lexis-nexis.com>.

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27 August 2001

The U.S. State Department confirms that it favors the lifting of sanctions placed on India after it conducted nuclear tests in May 1998. State Department spokesperson Richard Boucher says, "The US and India have been in the process of transforming our relationship...India is becoming more and more important to the United States as it assumes a larger role in world affairs and its economy expands to meet its enormous potential. We do want to work with Indian leaders to expand our cooperation... the administration is currently reviewing our policy on South Asia sanctions...and our improved relationship with India is not directed at any other country."

—"US confirms intention to lift sanctions on India," Deutsche Presse-Agentur, 27 August 2001; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

24 August 2001

India's Minister of State for External Affairs Omar Abdullah says that India will not sign the Comprehensive Test Ban Treaty (CTBT) in its present form because "it leads to discrimination." However he allays fears on the transfer of nuclear technology and says that "India is committed to the cause of preventing the misuse of nuclear technology."

—"India will not sign CTBT in its present form: Abdullah," Press Trust of India, 24 August 2001; in Lexis-Nexis Academic Universe, 24 August 2001, <http://web.lexis-nexis.com>.

20 August 2001

V.K. Chaturvedi, the chairman of the Nuclear Power Corporation of India Ltd. says that health surveys conducted at the nuclear power plants at Narora, Kalpakkam, and Kaiga on the effects of low-dose ionizing radiation show that none of the employees, their spouses, or offspring suffer from benign or malignant cancer. The study at Kaiga revealed only six cases of congenital anomalies among 1,343 offspring of employees, giving a prevalence of 0.45. But there was no case of cancer reported in all three categories--employees, offspring, and spouses.

—"Radiation effects of Kaiga minimal," *Times of India*, 20 August 2001; in Lexis-Nexis Academic Universe, 20 August 2001, <http://web.lexis-nexis.com>.

18 August 2001

Commenting on the existing nuclear sanctions on India, U.S. Undersecretary of State Richard Armitage says that "at least some of the sanctions" against Pakistan and India "will be coming off if the Congress concurs." Sanctions imposed on the two countries as a result of their nuclear detonation would be "the first to go." In further comments, Armitage says that the United States envisages a robust relationship with India. And "there are a lot of reasons we ought to engage with India, and we are going to...It would be unnatural for the world's oldest democracy to not have a more reasonable, in fact robust, relationship with the world's largest democracy, India...it would be unreasonable for a multi-ethnic, multi-religious democratic federation like the US not to have a more robust relationship with a multi-ethnic, multi-religious democratic federation like India." However, Armitage dispels the idea that the United States is seeking India to balance China. He says, "you should put zero value on that...I think whenever you try and establish a relationship with a country which is based on a third country, then you are doomed to failure. It is not a sustainable relationship. It is not something you can build on."

—"Sanctions imposed on India will come off soon: Armitage," Press Trust of India, 18 August 2001; in Lexis-Nexis Academic Universe, 19 August 2001, <http://web.lexis-nexis.com>; "Indo-US relations to be robust: Richard

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Armitage," Pakistan Newswire, 18 August 2001; in Lexis-Nexis Academic Universe, 19 August 2001, <http://web.lexis-nexis.com>.

14 August 2001

Senior Indian officials suggest that the government has reached a decision not to arm the short-range Prithvi missile variants with nuclear warheads. Only the Agni-II ballistic missiles will be armed with nuclear warheads. The rumored 3,000km-range Agni-III missile does not exist. To build longer-range missiles, India would have to build an entirely new class of ballistic missiles that would have an intercontinental reach. The Indian government is also acting on the recommendations of the Group of Ministers report on 'higher defense management' to create a civilian-military interface in the area of nuclear command and control. In the process, the government is trying to minimize disturbances in the existing military hierarchy and in the process trying to build a parallel hierarchy headed by a Chief of Defense Staff to manage nuclear forces. However, the cross-linkages between the political and military leaderships are still being worked out. In addition, the civilian leadership is also confronting opposition from the Indian Air Force, which is opposed to a tri-service nuclear command and has staked its claim to be the custodian of India's strategic strike capabilities.

—Atul Aneja, "India has 'problems' managing nuclear arms," *Hindu*, 14 August 2001; in Lexis-Nexis Academic Universe, 16 August 2001, <http://web.lexis-nexis.com>.

11 August 2001

The Indian Air Force (IAF) is deeply upset over the government's decision to give the Indian Army (IA) custody of the country's nuclear intermediate-range ballistic missile force. The IAF sees itself as the natural custodian of India's long-range strike assets and had earlier proposed to the government that one of its air commands be converted into a strategic forces command. However, the government decided otherwise. The IA insists that it is logical for it to be the custodian of long-range missiles because of its experience in handling rocket artillery and short-range ballistic missiles. Further, the Agni ballistic missiles are rail mobile and would require intensive manpower support (about 150 soldiers) for close defense of each train carrying the missile. The latter would be critical in securing launch pads and missiles all along the tracks against terrorist attacks. According to IA sources, the IAF does not have the requisite manpower resources to accomplish the task and would have to rely on the IA to provide protection.

—Vishal Thapar, "Army gets Agni II, IAF goes ballistic," *Hindustan Times*, 11 August 2001; in Lexis-Nexis Academic Universe, 13 August 2001, <http://web.lexis-nexis.com>.

10 August 2001

The U.S. Central Intelligence Agency (CIA) in its report to Congress on global proliferation trends says that India's May 1998 nuclear tests "were a significant milestone" and that India continues its nuclear weapons program; the acquisition of foreign equipment could benefit India in developing and producing more sophisticated weapons. The agency report states that "India continues to rely on foreign assistance for key missile and dual-use technologies, where it still lacks engineering or production expertise in ballistic missile development...entities in Russia and Western Europe remained the primary conduits of missile-related technology transfers during the first half of 2000."

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—"India continues N-weapons development program: CIA," Press Trust of India, 10 August 2001; in Lexis-Nexis Academic Universe, 10 August 2001, <http://web.lexis-nexis.com>.

27 July 2001

In order to meet the target of adding 20,000MW of nuclear power by the year 2020, India's Nuclear Power Corporation of India Ltd. has asked the federal government to amend the Atomic Energy Commission Act to allow for private sector equity participation.

—"NPC for relaxing norms to boost private participation," *Business Line*, 27 July 2001; in Lexis-Nexis Academic Universe, 27 July 2001, <http://web.lexis-nexis.com>.

25 July 2001

India and Russia arrive at an agreement on the costs of the 1000MW nuclear power plant to be built with Russian assistance at Koodankulam. V.K. Chaturvedi, the chairman and managing director of India's Nuclear Power Corporation of India Limited says Russia is committed to meeting 90 percent of the cost of equipment; the remaining 10 percent will be sourced from India and third countries. Russia will extend a credit to meet 54 percent of the total expenditure of the project at four percent interest which will be repayable in 14 equal installments one year after the commissioning of the plant. The first and second units of the Koodankulam project will be commissioned in 2007 and 2008 respectively. The cost of the entire project is estimated at 140 billion rupees; the projected cost of each megawatt of power is 70 million rupees.

—"India, Russia agree on cost of setting up of Kudankulam plant," Press Trust of India, 25 July 2001; in Lexis-Nexis Academic Universe, 25 July 2001, <http://web.lexis-nexis.com>; "Koodankulam plant to cost Rs. 14,000 crore," *Hindu*, 26 July 2001; in Lexis-Nexis Academic Universe, 27 July 2001, <http://web.lexis-nexis.com>.

23 July 2001

India and Russia begin negotiations on "pricing" concerning the two units of the 1,000MW nuclear power reactors that Russia will build for India at Koodankulam. The Russian government will provide the Indian government with credit to cover 85 percent of work undertaken by Russian entities which will be responsible for the design, supply of material, equipment and machinery, construction supervision, training of Indian personnel for operation, and the commissioning and operations of the plant until it is taken over by India's Nuclear Power Corporation of India Limited (NPCIL). NPCIL will be responsible for land acquisition, setting up infrastructural facilities under Russian supervision, and participation in the commissioning of the plant.

—"Pricing on setting up of nuclear power plants discussed," Press Trust of India, 23 July 2001; in Lexis-Nexis Academic Universe, 23 July 2001, <http://web.lexis-nexis.com>.

22 July 2001

British scientists from the Aldermaston Weapons Establishment publish a study in *Current Science* in which they conclude that the first round of India's May 1998 nuclear tests had a combined yield of about 20kt, not 60kt as claimed by Indian scientists. The estimate supports the conclusions of two groups of American scientists who had earlier claimed that the tests had a combined yield of 10-15kt. The new report is based on data from 12 seismic stations that recorded the seismic waves from the Pokhran test site. Indian scientists from the Bhabha Atomic Research Center have argued that "interference" of seismic waves from the two simultaneous explosions reduced

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the shock wave and as a result foreign scientists had underestimated the strength of the thermonuclear device. However, the British scientists have countered this by arguing that the interference effect at long-range is negligible. The *Current Science* report also claims that the three sub-kiloton explosions carried out by India in the second round of nuclear tests were not recorded anywhere outside India; and "this is a puzzle." Dr. P.K. Iyengar, the former chairman of India's Atomic Energy Commission also claims that India's thermonuclear device did not generate more than eight kilotons of energy. Iyengar says that he does not concur fully with the findings of the British scientists, but India should carry out more nuclear tests before signing the Comprehensive Test Ban Treaty. — "British report disputes Indian nuclear test claim," PTI, 22 July 2001; in Lexis-Nexis Academic Universe, 22 July 2001, <http://web.lexis-nexis.com>.

22 July 2001

Dr. Anil Kakodkar, chairman of the Atomic Energy Commission says that the Department of Atomic Energy (DAE) is designing advanced pressurized heavy water reactors which could operate for 100 years. Kakodkar says the new 220MW reactors would have improved safety features and would rely more on passive safety systems. The DAE hopes to build a mix of 220 and 500MW reactors to achieve its goal of adding 9,100MW of power by 2012. — "India can build advanced n-reactors in two years," *Hindu*, 22 July 2001; in Lexis-Nexis Academic Universe, 24 July 2001, <http://web.lexis-nexis.com>.

21 July 2001

In an address to the Indian Academy of Sciences, former Chairman of the Atomic Energy Commission Dr. R. Chidambaram asserts that India's May 1998 nuclear tests were "completely successful." He says that the objectives of the 1998 nuclear tests were to test a 15kt fission weapon, a 45kt thermonuclear bomb, and three sub-kiloton devices. Unlike India's first nuclear test in 1974, all the devices tested in 1998 were actually designed as weapons. Hence their weight and size was kept to a minimum. Chidambaram discloses that the sub-kiloton devices were difficult to design and the thermonuclear weapon used a boosted-fission device to start the fusion process. The yield of the thermonuclear weapon was deliberately held down to 45kt for two reasons. First, the device was tested in tunnels that were prepared in the 1980s; given their relative shallow depth, a larger yield would have resulted in a radioactive release into the atmosphere. Second, it was also necessary to minimize the seismic damage to a village five kilometers away from the test site. Chidambaram expresses confidence that Indian scientists are capable of building thermonuclear devices with a yield of 200kt or even greater power. — "Pokhran-II tests fulfilled all objectives," *Hindu*, 21 July 2001; in Lexis-Nexis Academic Universe, 24 July 2001, <http://web.lexis-nexis.com>.

20 July 2001

An Indian official says there are serious disagreements between the Indian Army and the Air Force over the structure of the country's nuclear command. "The Indian Air Force [IAF] wants a 1:1 structure or an air marshal for every Lieutenant General, for example, but the Army isn't agreeing as it is a larger organization and promotion opportunities, besides control are involved. Though it doesn't want representation in the command depending on size, it wants more officers than the IAF," the official says. The other bone of contention concerns control of India's dual-use aircraft and ballistic missiles. For example, the armed services do not seem reconciled to the idea that if a squadron of Mirage 2000s or Prithvi ballistic missiles were designated nuclear weapon carriers, then such assets

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would be placed under the control of the Chief of Defense Staff and would no longer be available for conventional operations.

—Srinjoy Chowdhury, "IAF, Army disagree over structure," *Statesman*, 20 July 2001; in Lexis-Nexis Academic Universe, 20 July 2001, <http://web.lexis-nexis.com>.

4 July 2001

India's Atomic Energy Regulatory Board (AERB) orders a demonstration plant for radiation processing of spices to shut down following the discovery of procedural lapses. The lapses include the failure of an audio alarm to operate, a non-functioning radiation interlock, and the non-availability of battery-powered survey meters at the premises.

—"AERB directs Vashi radiation unit to suspend operations," *Times of India*, 4 July 2001; in Lexis-Nexis Academic Universe, 18 July 2001, <http://web.lexis-nexis.com>.

3 July 2001

Chairman of the Atomic Energy Commission Dr. Anil Kakodkar declares that India is likely to begin construction of an Advanced Heavy Water Reactor (AHWR), which will generate 75 percent power from thorium during the period 2004-2011. The "Bhabha Atomic Research Center (BARC) has been working on the AHWR for the past seven-eight years and the project design is now ready," says Kakodkar.

—"AHWR construction to start in couple of years," Press Trust of India, 3 July 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

3 July 2001

Dr. A.P.J. Abdul Kalam, principal scientific advisor to the prime minister dismisses the impact of U.S. sanctions on India's nuclear and missile programs. "We went on building our missiles and generation nuclear energy despite the sanctions. So where do you see the impact of the US sanctions following Pokhran-II," says Kalam. He insists that the sanctions were comprehensive, but India was able to ride them out because of its strength in agriculture, industry, and strategic technology.

—"Scientific advisor says US sanctions have not affected nuclear program," PTI, 3 July 2001; in Lexis-Nexis Academic Universe, 3 July 2001, <http://web.lexis-nexis.com>.

27 June 2001

Dr. Anil Kakodkar, chairman of the Atomic Energy Commission says that India and Russia will sign the contract for the construction of the two nuclear power reactors at Koodankulam in September or October 2001. Russia will also supply India with six more reactors for operating nuclear power plants and other equipment for scientific nuclear centers.

—"Vladimir Radyuhin, "Koodankulam contract soon," *Hindu*, 28 June 2001; in Lexis-Nexis Academic Universe, 28 June 2001, <http://web.lexis-nexis.com>.

27 June 2001

In prepared remarks before Congress, U.S. Ambassador-Designate to India Robert Blackwill says that the U.S. strategy of imposing sanctions against India in the wake of the May 1998 nuclear tests has not worked and should

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be removed "briskly." Blackwill tells Congress that the best way to achieve U.S. nonproliferation objectives would be to have a "broad, comprehensive, and robust relationship with India on many subjects."

—Sridhar Krishnaswami, "Sanctions strategy has not worked: Blackwill," *Hindu*, 28 June 2001; in Lexis-Nexis Academic Universe, 4 July 2001, <http://web.lexis-nexis.com>.

23 June 2001

Chairman of the Atomic Energy Commission Dr. Anil Kakodkar tells officers and staff members of the Nuclear Fuel Complex that the goal of the Department of Atomic Energy (DAE) was to promote nuclear power as a benign source of power and also to make its generation cheaper anywhere in the country. With reference to the DAE's goal of producing 20,000MW of power by the year 2020, Kakodkar declares the goal feasible. He cautions however that "money is the only constraint."

—"DAE plans to make nuclear power generation cheaper," *Economic Times*, 23 June 2001; in Lexis-Nexis Academic Universe, 25 June 2001, <http://web.lexis-nexis.com>.

22 June 2001

India's Acting Permanent Representative to the United Nations (UN) Satyabrata Pal emphasizes the need for time bound nuclear disarmament. "No theory or doctrine can justify the indefinite retention of nuclear weapons by permanent members of this council. If they cling to their weapons, others will follow," says Pal in address to the ambassadors of the major nuclear powers.

—"India for time bound abolition of nuclear weapons," *Asia Pulse*, 22 June 2002; in Lexis-Nexis Academic Universe, 26 June 2001, <http://web.lexis-nexis.com>.

18 June 2001

The Chairperson and Managing Director of Nuclear Power Corporation V.K. Chaturvedi states that the federal government has approved the construction of the third and fourth phases of the Kaiga atomic power plant in the state of Karnataka. Chaturvedi also says that the first unit of the Koodankulam nuclear power plant will become operational in 2007. Commenting on the third and fourth units of the Tarapur plant, Chaturvedi says that the units will become operational in 2005 and 2006, respectively.

—"Kaiga atomic plant gets go ahead," *Times of India*, 22 June 2002; in Lexis-Nexis Academic Universe, 19 July 2001, <http://web.lexis-nexis.com>.

14 June 2001

Russia's Atomic Energy Ministry spokesman publicly anticipates that India will participate in Russia's proposed plan to recycle spent nuclear fuel in Russia.

—"Russia ready to reprocess nuclear fuel for China, India, Iran," Kyodo News Service, 14 June 2001; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

14 June 2001

Indian Machine Tools Limited signs a memorandum of understanding with the Bhabha Atomic Research Center to manufacture housing frames and radiation shielding windows. The housings and radiation shielding glass will be assembled at the company's division in Hyderabad.

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—"India's HMT machine tools ties up with atomic research body," *Asia Pulse*, 14 June 2001; in Lexis-Nexis Academic Universe, 14 June 2001, <http://web.lexis-nexis.com>.

28 May 2001

Senior Indian defense officials confirm that the private sector company Larsen & Toubro is building part of India's nuclear submarine--Advanced Technology Vessel--at its yard in Hazira. The hull of the submarine is being built in sections and a part was floated on a barge to Vishakhapatnam for tests, as the navy feared that the work might be monitored by Pakistan.

—"L&T building part of n-submarine," *Statesman*, 28 May 2001; in Lexis-Nexis Academic Universe, 29 May 2001, <http://web.lexis-nexis.com>.

28 May 2001

The Chairman of India's Atomic Energy Commission Dr. Anil Kakodkar says that a large number of scientists at the Bhabha Atomic Research Center have taken up the task of building nuclear weapons to meet India's requirements for a minimum deterrent. "We can put a large contingent of scientists for making nuclear weapons as per the country's requirements," Kakodkar says.

—"A large contingent of scientists in weapon making: Kakodkar," Press Trust of India, 28 May 2001; in Lexis-Nexis Academic Universe, 15 December 2004, <http://web.lexis-nexis.com>.

18 May 2001

The Chief of the Indian Navy Admiral Sushil Kumar declines the post of Chief of Defense Staff citing opposition from the other branches of the armed services, particularly the Indian Air Force (IAF). At a meeting with senior editors in the Defense Ministry, Kumar says that the present system of a Chief of Staff Committee was working well and he felt that the IAF should be responsible for nuclear weapons as the other services lacked the requisite delivery systems.

—"Navy chief says no to CDS," *Statesman*, 18 May 2001; in Lexis-Nexis Academic Universe, 21 May 2001, <http://web.lexis-nexis.com>.

16 May 2001

Prime Minister Atal Behari Vajpayee affirms India's intentions to honor the South East Asia Nuclear Weapons Free Zone. "We respect the status of South East Asia as a nuclear weapons free zone, as a nuclear weapon state we are willing to convert this recognition into a *de jure* commitment," states Vajpayee.

—"Vajpayee says India will honor southeast Asia nuclear-free pact," *AFX-Asia*, 16 May 2001; in Lexis-Nexis Academic Universe, 17 May 2001, <http://web.lexis-nexis.com>.

10 May 2001

Although the Indian Army's military exercise in the Rajasthan desert is being held against a "nuclear backdrop," the commander of the exercise Lt. General Pankaj Joshi of the Army's 1 Corps remarks, "we are discounting such a possibility," largely because strategists believe that Pakistan would be unlikely to use nuclear weapons to halt an offensive unless the "threshold level," the possible destruction of the Pakistan Army, was at hand. Indian strategists also doubt Pakistan's ability to build tactical nuclear warheads as this would require miniaturization.

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However, Joshi cautions that "we [India] are living in an environment where there are nuclear weapons...we cannot ignore their existence and should something happen, we have sufficient equipment for adopting defensive nuclear measures...we have the capacity to withstand a tactical nuclear strike."

—"Operation Poorna Vijay all about toil, tears, and sweat," *Statesman*, 10 May 2001; in Lexis-Nexis Academic Universe, 17 May 2001, <http://web.lexis-nexis.com>; "India completes 5 days of war games on Pakistan border," *AFX-Asia*, 10 May 2001; in Lexis-Nexis Academic Universe, 11 May 2001, <http://web.lexis-nexis.com>.

8 May 2001

In a comment on the ongoing military exercises in India's western sector the Air Officer Commanding-in-Chief, Western Air Command, Air Marshal S. Krishnaswamy says the objective of the operations is to validate tactics to intercept enemy aircraft laden with nuclear weapons, and conduct strategic strikes deep inside enemy territory to paralyze its war-waging potential. During the course of the exercise, pilots are oriented to fly through nuclear zones. "Modern aircraft have the facility to shut off external air supply in radioactive area...forces on the ground and in the air are being trained to survive nuclear, chemical, biological warfare," says Krishnaswamy. In addition, the Indian Air Force (IAF) is training for airborne delivery of weapons in a "dense air-defense environment behind enemy lines." All IAF air bases from Pathankot to Bikaner are participating in the exercises that involve the mobilization of 120 aircraft, 195 pilots, and approximately 600 surveillance and air defense personnel.

—"War games: IAF honing skills to tackle nukes," *Hindustan Times*, 8 May 2001; in Lexis-Nexis Academic Universe, 9 May 2001, <http://web.lexis-nexis.com>.

2 May 2001

The Indian foreign office issues a statement welcoming the Bush Administration's proposals for deep cuts in the U.S. nuclear arsenal as well for building missile defenses. The Indian foreign ministry describes the U.S. proposals as "a significant and far reaching" effort to move away from the "adversarial legacy of the Cold War."

—C. Raja Mohan, "India welcomes Bush plan for cut in n-arsenal," *Hindu*, 3 May 2001; in Lexis-Nexis Academic Universe, 3 May 2001, <http://web.lexis-nexis.com>.

3 May 2001

The Indian Ambassador to the United States Lalit Mansingh tells *Washington Times* that India and the United States are set to resume military cooperation that was suspended in the wake of India's May 1998 nuclear tests. Mansingh says that the U.S. decision came in the wake of Indian Foreign Minister Jaswant Singh's visit to Washington in April 2001. He also adds that if U.S. sanctions end on military and some scientific cooperation, India hopes to work on nuclear power with U.S. companies in an effort to provide energy for its rapidly growing economy without using polluting coal.

—"USA, India to resume military cooperation: Bush administration won't insist on signing of CTBT," *Statesman*, 3 May 2001; in Lexis-Nexis Academic Universe, 4 May 2001, <http://web.lexis-nexis.com>.

1 May 2001

India begins its first military exercise against a nuclear backdrop to test the offensive and defensive reactions of armed formations in simulated battlefield conditions. The exercise, called Operation Poorna Vijay, is designed to evaluate concepts and practice battle procedures during offensive and defensive operations. The exercise also

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involves participation by the Indian Air Force.

—"Army to hone skills against nuclear threat," *Times of India*, 1 May 2001; in Lexis-Nexis Academic Universe, 1 May 2001, <http://web.lexis-nexis.com>.

30 April 2001

India's Defense Ministry announces that it has informed Pakistan about impending large-scale Indian military maneuvers in the Rajasthan desert. The exercise is the largest in 13 years and involves about 60,000 troops backed by armor and a strike force drawn from the air force.

—"India to conduct large-scale war games near Pakistan border," AFP, 30 April 2001; in Lexis-Nexis Academic Universe, 30 April 2001, <http://web.lexis-nexis.com>.

24 April 2001

Chairman of India's Atomic Energy Commission (AEC) Dr. Anil Kakodkar calls for greater government investment in the nuclear power sector during the 11th plan period. According to Kakodkar, an investment of 50 million rupees is needed for establishing a one megawatt plant.

—"More funds sought for nuclear power technology," *Hindu*, 25 April 2001; in Lexis-Nexis Academic Universe, 2 May 2001, <http://web.lexis-nexis.com>.

23 April 2001

Chairman of Nuclear Power Corporation V. K. Chaturvedi says that India is at par with countries such as the United States and France in handling radioactive wastes generated in the nuclear power plants. However, India is still searching for a long-term waste repository.

—"Long term nuke site is years away," Press Trust of India, 23 April 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

12 April 2001

Chief of the Indian Navy Admiral Sushil Kumar is selected to become India's first Chief of Defense Staff, uniting the three armed services. He will also formally be in charge of India's nuclear forces.

—"Naval head will be India's first joint chief of defense," AFP, 12 April 2001; in Lexis-Nexis Academic Universe, 12 April 2001, <http://web.lexis-nexis.com>.

10 April 2001

Chairman of the Atomic Energy Commission Dr. Anil Kokodkar lays the foundation stone of an administrative building for the Prototype Fast Test Breeder Reactor (PFBR) at Kalpakkam, Tamil Nadu. According to the Chairman & Managing Director of the Nuclear Power Corporation V.K. Chaturvedi, "earth work on the project will begin in the last quarter of 2001 or the first quarter of 2002." The 30 billion rupee 500MW PBFR is expected to be completed in eight years. Subsequent fast breeder reactors are expected to be completed within six years. Chaturvedi estimates that the price of electrical power from a PFBR will be 60 million rupees per megawatt.

—"PFBR at Kalpakkam to be ready in 8 years," *Hindu*, 10 April 2001; in Lexis-Nexis Academic Universe, 10 April 2001, <http://web.lexis-nexis.com>.

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6 April 2001

Prime Minister Atal Behari Vajpayee reiterates India's offer to destroy its nuclear arsenal if all nuclear nations also agree to destroy their arsenal. "India has always stood for global nuclear disarmament," says Vajpayee, adding that "we [India] have taken certain steps in self-defense. We do not want nuclear weapons to proliferate. If other countries decide to destroy their nuclear arsenals, we are also prepared to do so."

—"India willing to destroy nuclear weapons if others do so: PM," Press Trust of India, 6 April 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

4 April 2001

B. Bhattacharjee, the scientist-engineer who led India's efforts to develop centrifuge-based uranium enrichment technology at the Rare Materials Project in Mysore, is appointed Director of the Bhabha Atomic Research Center (BARC). Prior to his new appointment, Bhattacharjee was Director of the Chemical Engineering and Technology Group of BARC.

—Arunkumar Bhatt, "New Bhabha Atomic Research Center chief assumes charge," *Hindu*, 4 April 2001; in Lexis-Nexis Academic Universe, 4 April 2001, <http://web.lexis-nexis.com>.

31 March 2001

The Vietnamese government replaces the peaceful nuclear cooperation agreement that Vietnam's National Institute of Nuclear Energy signed with India recently with a newer, shortened pact.

—"India-Vietnam cooperation cut," *Nuclear Engineering International*, 31 March 2001; in Lexis-Nexis Academic Universe, 6 April 2001, in <http://web.lexis-nexis.com>.

30 March 2001

The Indian Army makes public plans for a military exercise that simulates a nuclear battle environment. An Army spokesperson says, "...it will be a number of exercises collectively labeled Poorna Vijay to evaluate concepts and practice battle procedures during offensive and defensive operations in the nuclear backdrop." The exercise, which will be held in May 2001, will also involve participation by the Indian Air Force.

—"India to carry out biggest wargames after Operation Brasstacks," Press Trust of India, 30 March 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>; "Army to unfold 'Poorna Vijay' battlefield exercises," Press Trust of India, 30 March 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

28 March 2001

India's Chief of Army Staff General S. Padmanabhan meets National Security Advisor Brajesh Mishra to discuss defense reforms including the creation of the post of the chief of Defense Staff.

—"Army Chief, Brajesh Discuss Defense Reforms," *Hindu*, 29 March 2001; in Lexis-Nexis Academic Universe, 29 March 2001, <http://web.lexis-nexis.com>.

27 March 2001

Former Minister of State for Defense Arun Singh is appointed special advisor to Indian Defense Minister Jaswant Singh. Arun Singh is expected to advise the defense minister on the restructuring of higher defense management in

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India.

—Atul Aneja, "Role for Arun Singh," *Hindu*, 28 March 2001; in Lexis-Nexis Academic Universe, 28 March 2001, <http://web.lexis-nexis.com>.

26 March 2001

India's Ministry of External Affairs dismisses a report published by *Jane's Intelligence Review* that Pakistan is ahead of India in nuclear capability. The Indian ministry spokesperson says the report is speculative and offers "no foundation for policy constructs."

—"Article on n-capability speculative," *Statesman*, 26 March 2001; in Lexis-Nexis Academic Universe, 27 March 2001, <http://web.lexis-nexis.com>.

22 March 2001

The Kalpakkam-based fast-breeder test reactor (FBTR) completes 53 days of continuous operation. The reactor was synchronized with the Tamil Nadu grid on 6 October 2000 and was in operation, off and on, until 4 February 2001. Associate Director of the Reactor Operation & Maintenance Group R.P. Kapoor, says that "running continuously for 53 days at full power capacity has boosted our confidence to go in for the prototype fast-breeder reactor. We can now be reassured that all systems connected to the turbine and generators are functioning satisfactorily."

—R. Prasad, "FBTR passes 53-day continuous operation test," *Hindu*, 22 March 2001; in Lexis-Nexis Academic Universe, 25 March 2001, <http://web.lexis-nexis.com>.

22 March 2001

The Canadian government announces that it is lifting economic sanctions that were imposed on India in the wake of its May 1998 nuclear tests. The reasons for lifting sanctions are spelt out by Canadian Foreign Minister John Manley in London who in an address says, "...while we will continue to call upon India to renounce its nuclear weapons program, we have concluded that to pursue an effective dialogue we need to engage India in all sectors of interest and at all levels. India is a vigorous democracy with one sixth of humanity and an increasingly globally integrated economy."

—Sridhar Krishnaswami, "Canada lifts sanctions," *Hindu*, 22 March 2001; in Lexis-Nexis Academic Universe, 25 March 2001, <http://web.lexis-nexis.com>.

22 March 2001

Indian government sources suggest that India is unlikely to sign the Comprehensive Test Ban Treaty even if Pakistan signs the treaty. India's position on international treaties, the government sources say, is not linked to Pakistan. However, India will continue to abide by the unilateral moratorium on nuclear testing.

—"India unmoved by Pak. line on CTBT," *Hindu*, 22 March 2001; in Lexis-Nexis Academic Universe, 22 March 2001, <http://web.lexis-nexis.com>.

19 March 2001

The External Affairs Minister Jaswant Singh is appointed Minister of Defense in place of George Fernandes, who resigns.

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—"Jaswant is defense minister," *Hindu*, 19 March 2001; in Lexis-Nexis Academic Universe, 19 March 2001, <http://web.lexis-nexis.com>.

18 March 2001

Delivering a lecture - "Nehru Revisited" - organized by the Nehru Center in Mumbai, India's former Foreign Secretary J.N. Dixit alleges that the United States wanted India to detonate an atomic bomb prior to the Chinese nuclear test in 1964. According to Dixit, the suggestion was apparently made by then U.S. Secretary of State Dean Rusk, who reportedly told Nehru, "we [United States] will be supportive of you." Dixit also discloses that former Indian Prime Minister Narasimha Rao came close to ordering nuclear tests on two occasions during his tenure; but the decision was deferred because the scientists wanted to develop a hydrogen bomb.

—"US wanted India to detonate n-bomb in 1964: Dixit," *Times of India*, 18 March 2001; in Lexis-Nexis Academic Universe, 20 March 2001, <http://web.lexis-nexis.com>.

16 March 2001

The Chairman of India's Atomic Energy Commission Anil Kakodkar says that India is well on its way toward developing a thorium fueled advanced heavy water reactor (AHWR). According to Kakodkar, "final detailed project report as received on AHWR and thorium related fuel cycle technologies will be ready in 14-15 months based on which investment decision would be taken.

—"India on track for developing thorium fueled nuclear reactors," Press Trust of India, 16 March 2001; in Lexis-Nexis Academic Universe, 16 March 2001, <http://web.lexis-nexis.com>.

16 March 2001

The Department of Atomic Energy's (DAE) Atomic Energy Regulatory Board (AERB) confers safety awards to the heavy water plant at Kota, Rajasthan; the Manavalakurichi plant of Indian Rare Earths Ltd in Tamil Nadu's Kanyakumari district; and the fast breeder test reactor at the Indira Gandhi Center for Atomic Research, Kalpakkam. An AERB press release says that the 'incidence rate' for nuclear power plants was 3.08 compared to 10.86 for plants using gas and steam to generate electricity. The incidence rate for the Nuclear Fuel Complex, Hyderabad was 3.8 times less than that of factories handling heavy metal products outside the DAE; and the rate for heavy water plants was 12 times less than in chemical plants outside the DAE.

—"Three n-plants win safety awards," *Times of India*, 16 March 2001; in Lexis-Nexis Academic Universe, 20 March 2001, <http://web.lexis-nexis.com>.

16 March 2001

The United Kingdom expresses regret at Russia's decision to supply low-enriched uranium fuel for India's Tarapur atomic power station. The United Kingdom believes that the Russian Federation's decision violates its commitment as a member of the Nuclear Suppliers Group (NSG) not to export NSG trigger list goods to countries that have not entered into a comprehensive safeguards agreement with the International Atomic Energy Agency (IAEA).

—"UK statement regarding Russian supply of nuclear fuel to India," Foreign and Commonwealth Office - Hermes Database, 16 March 2001; in Lexis-Nexis Academic Universe, 16 March 2001, <http://web.lexis-nexis.com>.

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14 March 2001

Cracks in six blades produce excessive vibrations, which lead to a 42-day shut down of the Kaiga atomic power station.

—"Kaiga loses Rs. 18 crore due to shutdown," *India Business Insight*, 14 March 2001; in Lexis-Nexis Academic Universe, 20 March 2001, <http://web.lexis-nexis.com>.

10 March 2001

The Director of India's Indira Gandhi Center for Atomic Research, Kalpakkam says that construction of the 500MW prototype fast breeder reactor will commence by December 2001.

—"India: Nuclear power generation to touch 20,000MW by 2020," Press Trust of India, 11 March 2001; in Lexis-Nexis Academic Universe, 11 March 2001, <http://web.lexis-nexis.com>.

9 March 2001

In a public comment on the occasion of releasing the book *The Pakistan Trap* in New Delhi, Indian Defense Minister George Fernandes says that India launched its nuclear weapons program four decades ago due to threats from China, after India failed to get nuclear security guarantees from the West and the former Soviet Union.

—"India launched nuclear program due to Chinese threat - defense minister," Press Trust of India, 9 March 2001; in Lexis-Nexis Academic Universe, 11 March 2001, <http://web.lexis-nexis.com>.

4 March 2001

The Press Trust of India reports that the chiefs of the Army, Air Force, and Navy will soon draw up the blueprints of India's nuclear command and control infrastructure.

—"Defense chiefs to outline India's nuclear command, control structure," AFP, 4 March 2001; in Lexis-Nexis Academic Universe, 4 March 2001, <http://web.lexis-nexis.com>.

28 February 2001

Russia approves credit for 85 percent of the \$2.5 billion required to build the two 1000MW VVER reactors at Kudankulam. The loan will finance the design and construction of the plant. India is committed to repaying the sum within 12 years.

—"Russia to start work on Indian plant," *Nuclear Engineering International*, 28 February 2004; in Lexis-Nexis Academic Universe, 5 April 2001, <http://web.lexis-nexis.com>.

25 February 2001

The Chairman of India's Atomic Energy Commission (AEC) Anil Kakodkar says that the operation of the Tarapur nuclear power plant will not be affected even if Russia stops supplying fuel as India has made arrangements for "alternate fuel."

—"Nuke plant will not be affected if Russia stops fuel supply," Press Trust of India, 25 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

22 February 2001

The Director of Russia's Third Asia Department of the Russian Foreign Ministry Aleksandr Alekseyev says Russia will supply nuclear fuel for the Tarapur nuclear power station despite U.S. protests. Alekseyev adds, "Russia, as a

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member of the Nuclear Suppliers Group, is bound by certain international obligations and we have not violated any of our obligations and explained our position to the US...Russia has changed its internal legislation on the issue and made its position clear to everybody."

—Arun Mohanty, "Russia to continue n-fuel supply despite US protest," *Times of India*, 22 February 2001; in Lexis-Nexis Academic Universe, 17 March 2001, <http://web.lexis-nexis.com>.

22 February 2001

An Indian Defense Ministry spokesperson states that India is prepared to meet any challenge posed by Pakistan if Islamabad were to deploy nuclear missiles on its submarines. The spokesperson adds, "we are conscious of the reports and we are alive to the situation."

—"Nationwide International News," Press Trust of India, 22 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

21 February 2001

The Chairperson of India's Atomic Energy Regulatory Board Mr. S.P. Sukhatme criticizes the safety standards at Indian nuclear power plants at a conference organized by the Indian Association for Radiation Protection. Citing the example of the Kakrapar Atomic Power Station, Sukhatme says that while the individual exposure to workers at Kakrapar was below that of international standards (30 milliciverts), the collective dosage received by the workers was three times the international standards. Sukhatme also urges the Atomic Energy Commission to improve the design of pressurized heavy water reactors to reduce the leakage of tritium.

—"Kakrapar workers exposed to high radiation," *Times of India*, 21 February 2001; in Lexis-Nexis Academic Universe, 17 March 2001, <http://web.lexis-nexis.com>.

20 February 2001

U.S. Central Intelligence Agency (CIA) Director George Tenet informs the U.S. Senate's Select Committee on Intelligence that he believes there is a "good prospect" that India and Pakistan will conduct another round of nuclear weapons tests.

—"India, Pakistan could test nukes again," *Aerospace Daily*, 20 February 2001; in Lexis-Nexis Academic Universe, 1 March 2001, <http://web.lexis-nexis.com>.

20 February 2001

India rebuts international criticism of Russia's supply of nuclear fuel for the Tarapur nuclear power plant. Indian Foreign Ministry spokesperson R.S. Jassal says, "All imports of fuel for Tarapur Atomic Power Plant have always been under the IAEA safeguard regime....India has consistently and impeccably observed these safeguards. The latest import from Russia is similarly covered, IAEA having been informed about it."

—"India says Russian nuclear fuel approved by IAEA," AFP, 20 February 2001; in Lexis-Nexis Academic Universe, 20 February 2001, <http://web.lexis-nexis.com>.

20 February 2001

Pakistan expresses concern over Russia's supply of nuclear fuel for India's Tarapur nuclear plant and warns that Russia's decision to also supply arms to India would increase the conventional imbalance in the region.

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—"Pakistan raps Russian nuclear fuel shipment to India," AFP, 20 February 2001; in Lexis-Nexis Academic Universe, 20 February 2001, <http://web.lexis-nexis.com>.

19 February 2001

A spokesperson for the Russian naval delegation led by Russian naval chief Admiral Vladimir Kuroyedov denies speculations that Kuroyedov has held talks concerning the leasing of a Russian nuclear submarine with Indian officials.

—"Talks on leasing Russian nuclear submarine to India denied," BBC Summary of World Broadcasts, 19 February 2001; in Lexis-Nexis Academic Universe, 19 February 2001, <http://web.lexis-nexis.com>.

18 February 2001

The U.S. Department of State expresses regrets over Russia's plans to ship 58 tons of low-enriched uranium for India's Tarapur nuclear power plant. State Department spokesperson Philip Reeker says that "As a member of the 39-nation Nuclear Suppliers Group, Russia is committed not to engage in nuclear cooperation with any country that does not have comprehensive International Atomic Energy Agency safeguards on all its nuclear facilities."

—"U.S. opposes Russian nuclear fuel for India," *Hindu*, 18 February 2001; in Lexis-Nexis Academic Universe, 18 February 2001, <http://web.lexis-nexis.com>; Rahul Bedi, "Moscow ready to give India four reactors and provide nuclear fuel," *Irish Times*, 21 February 2001; in Lexis-Nexis Academic Universe, 21 February 2001, <http://web.lexis-nexis.com>.

17 February 2001

Speculation is rife that the Russian Navy Chief Admiral Vladimir Kuroyedev, who is currently in Mumbai to participate in an international fleet review, will discuss the lease of a nuclear powered submarine when he meets with Indian officials.

—"India, Russia to Discuss Nuclear Submarine Lease," *Times of India*, 17 February 2001; in Lexis-Nexis Academic Universe, 17 March 2001, <http://web.lexis-nexis.com>.

15 February 2001

Indian Defense Minister George Fernandes meets visiting Russian Prime Minister Illya Klebanov. However, Fernandes declines to comment on rumors that India is negotiating the lease of Tu-22M3 bombers and nuclear submarines from Russia. When asked by reporters about the subjects discussed during the meeting, Fernandes comments, "we discussed what we have to."

—"Nationwide International News," Press Trust of India, 15 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

14 February 2001

The Chairman and Managing Director of the Nuclear Power Corporation of India Ltd. V.K. Chaturvedi says that India's first indigenous 500MW pressurized heavy water nuclear reactors at Tarapur will be completed in 2004-2005 respectively. The reactors have a sanctioned cost of 64.21 billion rupees and 21 percent of the work on the units has already been completed.

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—"First indigenous 500MW nuclear power plant to be commissioned by 2004," BBC Summary of World Broadcasts, 14 February 2001; in Lexis-Nexis Academic Universe, 13 February 2001, <http://web.lexis-nexis.com>.

14 February 2001

In an address at the Brookings Institute in Washington, D.C., the chairman of the Near East and South Asia Subcommittee of the Senate Foreign Relations Committee, Senator Sam Brownback urges the Bush Administration to lift the U.S. economic sanctions that were imposed on India in the wake of the 1998 nuclear tests. Senator Brownback says that India and the United States face a "common threat in China" and need to draw closer to one another. Brownback also recommends that the United States focus on trade issues with India, continue to work on nonproliferation differences, start evaluating conditions under which to waive the military sanctions, step up Indo-U.S. defense and security cooperation and increase "our already growing technical cooperation."

—"Nationwide International News," Press Trust of India, 14 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

13 February 2001

Russia is "seriously considering" leasing four Tu-22M3 nuclear-capable bombers to India says Victor Komardin, deputy director of Rosoboroneksport, Russia's state-owned arms export agency. Komardin discloses that since the Tu-22M3 is an expensive bomber, Russia has proposed to lease them to New Delhi, after which India could possibly purchase them at a "depreciated cost." Commenting on the rumors that Russia will lease nuclear powered submarines to India, Komardin says that "such a wish has been expressed." But he adds that this is "a delicate issue" and concerns Russia's international commitments.

—Arun Mohanty, "Russia Mulls Leasing N-Capable Bombers to India," *Times of India*, 13 February 2001; in Lexis-Nexis Academic Universe, 18 March 2001, <http://web.lexis-nexis.com>.

12 February 2001

The head of the Indian Atomic Energy Commission's publicity division Dr. S.K. Malhotra says that all 14 nuclear power reactors in India have built-in protection mechanisms to enable them to withstand high seismic activities. Malhotra adds that India complies with the International Atomic Energy Agency's guidelines in this regard and all Indian nuclear power plants have already been subjected to 'operating basis earthquake' and 'safe shutdown earthquake'.

—"India: 'Nuclear plants can withstand quake'," *Hindu*, 12 February 2001; in Lexis-Nexis Academic Universe, 12 February 2001, <http://web.lexis-nexis.com>.

12 February 2001

The Chairman of India's Atomic Energy Commission Dr. Anil Kakodkar welcomes Russia's proposal to build four more 1,000MW nuclear reactors at Koodankulam in addition to the two upcoming 1,000MW units at the same site. However, Kakodkar cautions, a "lot of work needs to be done in this regard."

—"Nationwide International News," Press Trust of India, 12 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

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8 February 2001

The Director of the Indira Gandhi Center for Atomic Research, Kalpakkam, S.B. Bhoje says that India's atomic power generation is projected to increase to 20,000MW by 2020. At present only 2.5 percent of India's power generation comes from nuclear power; but that figure will expand to 5 percent by 2020.

—"Nationwide International News," Press Trust of India, 8 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

8 February 2001

Indian Foreign Secretary Lalit Mansingh raises Indian concerns regarding the sale of Chinese nuclear technology and missiles to Pakistan with visiting Chinese Assistant Foreign Minister Wang Yi.

—"Nationwide International News," Press Trust of India, 8 February 2001; in Lexis-Nexis Academic Universe, 5 July 2001, <http://web.lexis-nexis.com>.

5 February 2001

Indian Prime Minister Atal Behari Vajpayee tells journalists that India will maintain a moratorium on nuclear tests, but does not plan to sign and ratify the Comprehensive Test Ban Treaty (CTBT).

—Vladimir Solntsev, "India to observe moratorium on nuclear tests-premier," ITAR-TASS News Agency, 5 February 2001; in Lexis-Nexis Academic Universe, 6 February 2001, <http://web.lexis-nexis.com>.

4 February 2001

Indian Foreign Minister Jaswant Singh tells a gathering of Egyptian academicians and diplomats in Cairo that India does not have a strategic alliance or nuclear cooperation with Israel.

—"Foreign minister denies nuclear cooperation with Israel," BBC Summary of World Broadcasts, 6 February 2001; in Lexis-Nexis Academic Universe, 6 February 2001, <http://web.lexis-nexis.com>.

29 January 2001

The Chairman of India's Atomic Energy Commission Dr. Anil Kakodkar says that India will complete the first phase of a 500MW reactor and a related desalination plant at Kalpakkam by 2002. The water treated in the desalination plant will be used in the existing 170MW pressurized heavy water reactor at Kalpakkam.

—"Phase 1 by 2002," *Nuclear Engineering International*, 29 January 2001; in Lexis-Nexis Academic Universe, 29 January 2001, <http://web.lexis-nexis.com>.

28 January 2001

Officials from India's Nuclear Power Corporation say that the 440MW Kakrapar Atomic Power Station, which is located a few hundred kilometers from Bhuj in Gujarat state, the epicenter of a massive earthquake, is functioning normally. The plant incorporates a two-layered earthquake resistance design. In the first-stage, the plant is provided with safety features that can withstand and operate during earthquakes which have a return period of 100 years. In the second stage, the power station is designed for a safe shut-down earthquake, which means that in the event of a massive earthquake, the plant shuts down automatically. Once the power reactor is in place, a network of vibration monitoring devices is emplaced to detect earthquakes and trip the plant automatically if necessary.

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—"N-power stations working normally," *Business Line*, 28 January 2001; in Lexis-Nexis Academic Universe, 28 January 2001, <http://web.lexis-nexis.com>.

22 January 2001

The Indian Air Force (IAF) advocates the formation of a "nuclear air command" to consolidate India's strategic resources under the IAF. The IAF's advocacy is premised on the assumption that it is the sole service that has the required delivery platforms to undertake such a role. In a paper titled 'Vision 2020' the IAF makes the case that the army might not need a nuclear arm because of the incongruity between tactical nuclear weapons and India's nuclear doctrine. It also argues that nuclear submarines are still "beyond the Indian navy's reach."

—"Indian Air Force Urges formation of 'nuclear air command'," *Aerospace Daily*, 22 January 2001; in Lexis-Nexis Academic Universe, 22 January 2001, <http://web.lexis-nexis.com>.

17 January 2001

India's army chief General Padmanabhan says that the Indian Army is modifying its training, tactics, and equipment to prepare itself to fight a nuclear war. Measures to achieve this capability include the upgrading of armor to be able to operate in a nuclear, biological, and chemical weapons environment, the acquisition of fabricated shelters for protection against a nuclear strike, and the building of information technology-based command, control, communications, and intelligence systems by 2010. Padmanabhan proposes to "fine tune" India's nuclear strategy, saying "if we have the capability, it is necessary that we should be prepared with our doctrines, tactics, and plans." In the event of a nuclear strike, the Indian Army (IA) will adopt "wider dispersal tactics," explains Padmanabhan. He adds that in the near certainty of an electronic blackout where there would be "zero or no communications," battalion and brigade commanders and small special forces must function effectively to achieve their goals. However, the task of India's nuclear force will be to deter potential adversaries as nuclear weapons are not war fighting weapons. Nonetheless India must build up a second-strike capability, "...so crushing that the other side would think 20 times before undertaking the initial strike. The fact that we [India] have a thermonuclear weapon is also not unknown to the other side. They have nothing matching it."

—Rahul Bedi, "General Sunderajan Padmanabhan India's Chief of Army Staff," *Jane's Defense Weekly*, 17 January 2001, <http://www4.janes.com>.

11 January 2001

In a meeting with the speaker of India's lower house of parliament (Lok Sabha), G.M.C. Balayogi, the Chairman of the Standing Committee of the National Peoples' Congress (NPC) Mr. Li Peng suggests that China and India do not pose any threat to each other and share similar views on a multipolar world order. In turn, Balayogi suggests that India and China work together to achieve complete nuclear disarmament.

—Press Trust of India, 11 January 2001; in Lexis-Nexis Academic Universe, 11 January 2001, <http://web.lexis-nexis.com>.

8 January 2001

India and Vietnam sign a memorandum of understanding (MOU) to continue cooperation in the peaceful utilization of nuclear energy. The basis for this MOU is the agreement between the two governments for the Cooperation for Utilization of Atomic Energy for Peaceful Purposes signed in 1986, which is valid until May 2002.

Related content is available on the website for the Nuclear Threat Initiative, www.nti.org.



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Vietnam expresses interest in concepts relating to nuclear reactors for a future nuclear energy generation program and the new MOU calls for continued cooperation in the field of human resources development and exchange of expertise. As many as 30 Vietnamese scientists have already been trained at Indian facilities dealing with peaceful uses of nuclear energy and the MOU renews visits of a number of Vietnamese scientists to nuclear facilities in India and provides the framework for Indian scientists to cooperate with the Vietnamese Atomic Research Institute. India will also supply laboratory equipment for the nuclear research institute in Dalat in South Vietnam on a part grant and part purchase basis.

—"Indian Government Memorandum of Understanding between the Department of Atomic Energy, India (DAE) and the Ministry of Science, Technology, and Environment, Vietnam (MOSTE)," M2 Presswire, 9 January 2001; in Lexis-Nexis Academic Universe, 9 January 2001, <http://web.lexis-nexis.com>; "India to assist Vietnam in nuclear research," *Hindu*, 9 January 2001; in Lexis-Nexis Academic Universe, 9 January 2001, <http://web.lexis-nexis.com>.

5 January 2001

Delivering his acceptance speech after being conferred an honorary doctorate at the Mohanlal Sukhadia University in Udaipur, former Chairman of India's Atomic Energy Commission (AEC) Dr. R. Chidambaram says that India should have new tie ups at the international level in nuclear energy. However India's new slogan should be: "self-reliance as immunity against denial of technology." Future collaborations, according to Chidambaram, should be on an equal and participatory basis. He points out that in the next two decades, India would need to create a nuclear power capacity of 20,000MW to meet its energy demands. In pursuit of that goal India is now building 500MW reactors rather than pursuing the earlier policy of constructing 200MW reactors. In the future, India will also increasingly use thorium in the production of nuclear energy.

—"India: Future n-energy tie-ups only on equal basis: AEC chief," *Hindu*, 6 January 2001; in Lexis-Nexis Academic Universe, 6 January 2001, in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

5 January 2001

The Indira Gandhi Center for Atomic Research (IGCAR) at Kalpakkam hopes to begin construction of India's 500MWe Prototype Fast Breeder Test Reactor by early 2002. The bulk of the design work on the reactor has been completed; the reactor will use mixed oxide fuel and liquid sodium as coolant. The IGCAR's major private and public sector partners include: Larsen & Toubro, Bharat Heavy Electricals Limited, MTAR Technologies Pvt. Ltd., Kirloskar Brothers Ltd., Steel Authority of India Ltd., Mishra Dhatu Nigam Ltd., Nuclear Fuel Complex, Indian Institutes of Technology at Chennai, Mumbai, and Delhi, the Structural Engineering Research Center at Chennai, the Fluid Control Research Institute in Palakkad and a defense laboratory.

—"A Mission at Kalpakkam: IGCAR is All Set To Begin the Construction of the PFBR," *Business Insight*, 5 January 2001; in Lexis-Nexis Academic Universe, 5 January 2001, <http://web.lexis-nexis.com>.

4 January 2001

India's Group of Ministers (GoM) consisting of the defense, external affairs, home, and finance ministers, as well as the national security advisor, accepts the Arun Singh committee's recommendation to appoint a Chief of Defense Staff (CDS). The recommendations of the GoM will be forwarded to the prime minister and the cabinet for formal approval. The CDS will report to the defense minister and represent the armed services at cabinet meetings. The CDS is also expected to have a deputy, a secretariat, and be given formal charge of India's nuclear forces.

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—"Nod to proposal for Chief of Defense Staff," *Statesman*, 4 January 2001; in Lexis-Nexis Academic Universe, 4 January 2001, <http://web.lexis-nexis.com>.

3 January 2001

The Chairman and Managing Director of India's Nuclear Power Corporation V.K. Chaturvedi says that India expects the "general agreement on the implementation of the [Koodankulam nuclear power] project to be signed in June-July after the techno-commercial offer is made by the Russians." According to Chaturvedi, the Indian government has approved the construction of the third and fourth phases of the Kaiga nuclear power plant projects and approval of the same projects by the union cabinet is expected later during January 2001. In addition, construction on the third and fourth reactors at Tarapur is already under way. Chaturvedi emphasizes that the capacity factor of India's nuclear power stations improved from 75 percent in 1999 to 81 percent in 2000.

—"Koodankulam Detailed Project Report 'Almost Ready'," *Business Line*, 3 January 2001; in Lexis-Nexis Academic Universe, 3 January 2001, <http://web.lexis-nexis.com>.

1 January 2001

The *Jane's Intelligence Review* asserts that India's nuclear weaponization is proceeding at a slow pace. In comparison, Pakistan has moved more quickly to implement effective systems and procedures for its more modest nuclear arsenal. India's slow attempts at achieving an operational nuclear capability can be attributed to its political leadership, which has not thought through a nuclear use doctrine and does not regard nuclear weapons as instruments that can be used on the military battlefield. However, Pakistan's nuclear forces have been controlled by the Army; and the weapons have been integrated into the country's military strategy.

—Andrew Koch, "India, Pakistan: nuclear arms race gets off to a slow start," *Jane's Intelligence Review*, 1 January 2001, www4.janes.com, (2 March 2005).

1 January 2001

India and Pakistan exchange list of nuclear installations and facilities in accordance with the 1990 agreement that prohibits both countries from attacking such installations.

—"Pakistan, India swap lists of nuclear installations," AFP, 1 January 2001; in Lexis-Nexis Academic Universe, 1 January 2001, <http://web.lexis-nexis.com>.

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2000

Late 2000

The technical problems related to the miniaturization of the 100MW nuclear reactor for the Advanced Technology Vessel (ATV) are resolved with the help of Russian experts, and the final design is frozen. The proposed vessel will have a top speed of 35 knots. It will be equipped with torpedo tubes to carry nuclear tipped cruise missiles, and incorporate 12 vertical launch tubes for ballistic missiles. The ATV is expected to enter trials in 2005 and enter the Indian Navy's (IN) fleet by 2012. The IN expects to order three ATV-class vessels. Indian naval officers reportedly claim that the ATV will be superior to the Chinese Xia-class nuclear submarines.

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—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), p. 658.

23 December 2000

The Unit 4 reactor of the Rajasthan Atomic Power Station (RAPS) is declared commercial. It first reached criticality on 3 November 2000 and was synchronized to the Northern grid on 17 November 2000.

—Government of India, Department of Atomic Energy Annual Report: 2000-2001, Executive Summary available at www.dae.gov.in.

24 November 2000

Addressing the Rajya Sabha (India's upper house of parliament), India's Minister of External Affairs Jaswant Singh says that the issue of further nuclear testing "is an inherent right and it is not foreclosed or foregone." He adds, however, that India will not prevent the Comprehensive Test Ban Treaty (CTBT) from coming into force.

—"Right to Conduct More N-Tests Not Closed: Jaswant," *Times of India* (Mumbai), 25 November 2000, <http://timesofindia.indiatimes.com>.

12 November 2000

In a televised interview, India's National Security Advisor Brajesh Mishra says the government discussed the possibility of nuclear tests "two weeks or so" upon coming to power. The final decision was made after Pakistan began talking of war, he adds. Mishra remarks that he was a part of a team involved in the secret nuclear test plans.

—"War Threats from Pakistan Prompted India's Nuclear Tests," Agence France Presse, 10 November 2000, in Lexis-Nexis Academic Universe, 10 November 2000, <http://web.lexis-nexis.com>.

30 October 2000

Speaking at the Bhabha Atomic Research Center (BARC), Atomic Energy Commission (AEC) Chairman R. Chidambaram says the May 1998 nuclear tests provided India with "the capability to design and fabricate nuclear weapons [in the range] of low-yields up to 200 kilotons."

—"Scientist Boasts of India's Nuclear Capability," United Press International, 30 October 2000, in Lexis-Nexis Academic Universe, 21 March 2001, <http://web.lexis-nexis.com>; "Indian Can Make Nuke Bomb of up to 200 Kt Yield: Chidambaram," Rediff on the Net, 30 October 2000, www.rediff.com.

8 October 2000

India's Chief of Air Staff Anil Yashwant Tipnis says the Indian Air Force has worked out a strategy to respond to nuclear threat. He remarks that given India's nuclear no-first-use policy, "the only option then is to develop a second strike capability."

—"IAF Draws Up Nuclear Strategy," *Times of India* (Mumbai), 8 October 2000, <http://timesofindia.indiatimes.com>.

5 October 2000

Russian Prime Minister Mikhail Kasyanov proposes an agreement on "mutual security of secret materials" to India to ensure safety of bilateral secret documents. The Federal Security Service in Russia and Interior Ministry in India

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will be responsible for enforcement of this agreement's provisions.

—Vladimir Radyuhin, "Secrecy, Defense, Nuclear Deals," *Hindu* (Chennai), 6 October 2000, <http://hinduonline.com>.

4 October 2000

Russian President Vladimir Putin visits the Bhabha Atomic Research Center (BARC). He says Indo-Russian cooperation in the nuclear energy sector will not be limited only to the Koodankulam project. He expresses confidence that bilateral cooperation in this field "will grow further and rapidly in the coming years."

—Government of India, *Department of Atomic Energy Annual Report: 2000-2001*, Executive Summary available at www.dae.gov.in; "Vladimir Putin's Visit to BARC Boosts India's Nuclear Status," *Times of India* (Mumbai), 6 October 2000, in Lexis-Nexis Academic Universe, 15 March 2001, <http://web.lexis-nexis.com>; "Russia is Not Going to Quit India's Nuclear Energy Market - Vladimir Putin," Russian Economic News, 6 October 2000, in Lexis-Nexis Academic Universe, 21 March 2001, <http://web.lexis-nexis.com>.

3-4 October 2000

India and Russia sign 11 agreements for cooperation in military, nuclear, science and technology areas. Further, they issue a declaration on "Strategic Partnership," stating that cooperation is based "upon the principles of sovereignty, equality and territorial integrity..., noninterference in internal affairs, mutual respect and mutual benefit." The sides underscore "consolidating defense and military-technical cooperation in a long-term perspective, deepening service-to-service cooperation, [and] cooperating in the peaceful use of nuclear energy and the peaceful use of outer space" among other issues.

—*Declaration on Strategic Partnership between Republic of India and the Russian Federation*, Ministry of External Affairs, Government of India, www.meadev.nic.in; David Gardner, "India, Russia Sign 'Strategic Partnership'," *Financial Times* (London), 4 October 2000, in Lexis-Nexis Academic Universe, 3 October 2000, <http://web.lexis-nexis.com>; "India, Russia Sign 11 Pacts, to Further Cooperation," *Business Line* (Chennai), 4 October 2000, in Lexis-Nexis Academic Universe, 15 March 2001, <http://web.lexis-nexis.com>.

October 2000

The Heavy Water Board (HWB) exports "16 megatons" of heavy water to South Korea. The shipment reportedly meets the technical specifications of the purchaser.

—Government of India, *Department of Atomic Energy Annual Report: 2000-2001*, Executive Summary available at www.dae.gov.in.

26 September 2000

Unit 1 of the Rajasthan Atomic Power Station (RAPS) is shut down in order to seal a light water leak from one of its end shields. In addition to repairing the leak, the Department of Atomic Energy (DAE) claims that the reactor's coolant channels will undergo a partial replacement.

—Government of India, *Department of Atomic Energy Annual Report: 2000-2001*, Executive Summary, www.dae.gov.in.

21 September 2000

India's National Security Advisor Brajesh Mishra says that India reserves the right to reverse the moratorium on

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nuclear testing if its national security interests are jeopardized. He adds that the government will continue to work on building consensus on Comprehensive Test Ban Treaty (CTBT) issue.

—"India Can Withdraw Moratorium on N-Tests: Mishra," *Hindu* (Chennai), 22 September 2000, <http://hinduonline.com>.

21 September 2000

Addressing the 44th International Atomic Energy Agency (IAEA) conference, Atomic Energy Commission (AEC) chairman R. Chidambaram says that the Bhabha Atomic Research Center (BARC) is working on the design and development of an advanced heavy water reactor (AWHR), which will use plutonium and U233 as fuel. The reactor is expected to utilize thorium and "is an effort towards developing innovative reactor and fuel cycle designs for sustainable development."

—"India's Nuclear Power Plan is Progressing," *Times of India* (Mumbai), 21 September 2000, in Lexis-Nexis Academic Universe, 21 March 2001, <http://web.lexis-nexis.com>.

19 September 2000

Russia's Vice Prime Minister Ilya Khlebanov says Indo-Russian nuclear cooperation will not be limited to the Koodankulam project. He remarks that Russia intends to have "at least 50 percent share in nuclear power generation target set by India."

—"Russia Deputy Premier in India; Nuclear Cooperation to Be Expanded," BBC Summary of World Broadcasts, 21 September 2000, in Lexis-Nexis Academic Universe, 20 September 2000, <http://web.lexis-nexis.com>.

20 September 2000

Addressing United Nations General Assembly (UNGA), India's External Affairs Minister Jaswant Singh says that India's moratorium on nuclear testing "meets basic obligation of the CTBT." Singh adds that India "remains ready to participate in agreed and irreversible steps such as de-alerting of nuclear forces... [and] global agreement on no-first-use and non-use of nuclear weapons against non-nuclear weapon states."

—"India Meets Basic Obligations of CTBT: Jaswant," Rediff on the Net, 20 September 2000, <http://rediff.com>.

2 September 2000

Prime Minister's Principal Secretary and National Security Advisor Brajesh Mishra says the government has "no plans to sign the CTBT [Comprehensive Test Ban Treaty] in the immediate foreseeable future." He adds that any decision on the issue will be made only after consensus is achieved in India, and this "has not happened so far."

—"No Plan to Sign CTBT," *Hindu* (Chennai), 3 September 2000, <http://hinduonline.com>.

25 August 2000

Japan's Prime Minister Yoshiro Mori says he "strongly expects India to sign the CTBT [Comprehensive Test Ban Treaty]" so that both countries can take initiatives in nuclear disarmament and nonproliferation, as well as promote their "amicable relations."

—"Sign CTBT for Better Ties: Mori," *Times of India* (Mumbai), 25 August 2000, <http://timesofindia.indiatimes.com>.

22 August 2000

Former Atomic Energy Commission (AEC) Director P.K. Iyengar makes the case that the thermonuclear device

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tested in May 1998 most likely attained partial burn; less than "10 percent" of the fusion core was burnt, which led to a lot of tritium being produced. The presence of tritium in the collapsed test shaft is one of the surest indicators of partial thermonuclear burn. Iyengar further argues, "The crucial question is not what the total yield of the device was, but what was the ratio of fission to fusion energy...for a given total yield, the greater the fraction of the fusion energy, the more efficient is your thermonuclear device." In India's case however, the estimated ratio was "around 1:1, and no one has so far, to my knowledge either publicly or privately disputed that number."
—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 407.

9 August 2000

Former Atomic Energy Commission (AEC) chairman P.K. Iyengar says the Indian government should not rush to sign the Comprehensive Test Ban Treaty (CTBT) and conduct further tests "to improve the yield of thermonuclear device." He adds that the military "will not accept the weapons that are not sophisticated enough." He says that an independent peer review committee has to review the results of Pokhran-II nuclear tests.

—"News from Our World Resources: Urge for More Nuclear Explosions in India," *Gulf News*, 10 August 2000, in Lexis-Nexis Academic Universe, 17 March 2001, <http://web.lexis-nexis.com>.

August 2000

In a meeting arranged to clear the Indian military's doubts about the credibility of the nuclear warhead designs tested in May 1998, nuclear scientists Kakodkar and Chidambaram assure senior military officers that the Bhabha Atomic Research Center (BARC) is capable of designing high-yield, even megaton fusion weapons, and 'enhanced radiation' or neutron weapons without further testing. However, the Indian military remains unconvinced.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 432.

30 July 2000

Former Atomic Energy Commission (AEC) Chairman P.K. Iyengar says that if the Indian government wants to develop a credible minimum deterrent, it cannot sign the Comprehensive Test Ban Treaty (CTBT) now. He says that "many more tests will be needed to try out different designs like boosted fission device, the two-stage fusion device and the neutron bomb which India is yet to test." Iyengar remarks that India's fusion device burned only partially during the test and he doubts whether "complete burn wave was established." Therefore he is skeptical of claims that the scientists have collected sufficient data from only one test of a fusion device. Iyengar adds that the government must address the issue of "safe and reliable command and control" system before it proceeds with signing the CTBT.

—"Govt Warned Against Signing CTBT in Haste," *Hindu* (Chennai), 31 July 2000, <http://hinduonline.com>.

24 July 2000

Delivering a lecture on the subject of "Role of Physics in National Security" in Mumbai, former Atomic Energy Commission (AEC) chairman P.K. Iyengar underscores the importance of a white paper that would compare India's nuclear capabilities with its adversaries. Further he says that a "peer review" of Pokhran tests is necessary for the development of a credible minimum deterrent. Iyengar adds that a research and development review mechanism

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should be in place in India. He remarks that "the entire system of nuclear deterrence should be put at the disposal of the armed forces to ensure near-instant retaliation in case of an attack." Talking to reporters after lecture, Iyengar says that the peer review should be "entrusted only to scientists." The AEC Chairman R. Chidambaram says that India has "the capability to design and fabricate a range of nuclear weapons from sub-kiloton yield to 100 kilotons." He reiterates that India's nuclear tests were "carefully planned and all scientific objectives were fully achieved." Chidambaram remarks that nuclear physics can contribute to national defense in other areas such as cyber-warfare and bio-terrorism.

—Arunkumar Bhatt, "'Peer Review' of Pokhran Tests Sought," *Hindu* (Chennai), 25 July 2000, <http://hinduonline.com>.

4 July 2000

India's Department of Science and Technology and Russia's leading nuclear research institute, Kurchatov Center, sign a Memorandum of Understanding (MoU) to expand cooperation in the field of nuclear physics. The MoU will be effective for the period of three years.

—Vladimir Radyuhin, "India, Russia Sign Pact on Nuclear Cooperation," *Hindu* (Chennai), 6 July 2000, <http://hinduonline.com>.

30 June 2000

Talking to the media upon completion of his visit to Italy and Portugal, Prime Minister Atal Bihari Vajpayee says that he expects that a consensus on the Comprehensive Test Ban Treaty (CTBT) will be achieved by the end of the year. He does not say whether the consensus will be in favor of or against the treaty.

—"Indian Consensus in Favor of CTBT Expected by Year End, PM Says," Deutsche Presse-Agentur, 30 June 2000, in Lexis-Nexis Academic Universe, 30 June 2000, <http://web.lexis-nexis.com>.

28 June 2000

Addressing the media after signing the Joint Declaration with the European Union, Prime Minister Atal Bihari Vajpayee says that political consensus on Comprehensive Test Ban Treaty (CTBT) issue will be reached after parliament convenes in July.

—K.A. Badarinath, "Consensus on CTBT in Monsoon Session: PM," *Times of India* (Mumbai), 29 June 2000, <http://timesofindia.indiatimes.com>.

21 June 2000

The Indian government issues a statement, stating that India's nuclear power generation during 1999-2000 reached "a record high of more than 13,200 million units... [and] the nuclear power sector has grown at an average compounded rate of about 14 percent per year since 1995-1996 even though no additions were made to the nuclear power generating capacity during the period. Nuclear power reactors achieved plant load factor of nearly 80 percent." The statement also indicates that heavy water production at Tuticorin, Thal, Hazira and Kota reached a "five-year high" during 1999-2000.

—"Record N-Power Output in 1999," *Times of India* (Mumbai), 21 June 2000, <http://timesofindia.indiatimes.com>.

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14 June 2000

The spokesperson for India's Ministry of External Affairs R.S. Jassal says that India's security concerns go beyond South Asian confines. He adds that soon after India's nuclear tests Prime Minister Vajpayee referred to the China threat.

—"India Rejects Pak Offer," *Times of India* (Mumbai), 15 June 2000, <http://timesofindia.indiatimes.com>.

13 June 2000

In an official statement, Pakistan offers India "a strategic restraint regime for avoidance of an arms race, nuclear and conventional, and confidence-building in the region." According to the statement, Pakistan is "willing to consider any restraint arrangement on a reciprocal basis with India."

—Amit Baruah, "Pakistan Proposes Nuclear Restraint Regime," *Hindu* (Chennai), 14 June 2000, www.hinduonline.com.

7 June 2000

During the meeting with Japanese Foreign Minister Yohei Kono, India's Defense Minister George Fernandes says that India supports universal nuclear disarmament. He adds that it is "just a matter of time" that India signs the Comprehensive Test Ban Treaty (CTBT), and it is not "so far in the future."

—"Signing CTBT 'a Matter of Time'," *Hindu* (Chennai), 8 June 2000, <http://hinduonline.com>.

3 June 2000

Speaking in Singapore, India's Minister of External Affairs Jaswant Singh says that India has no intention of engaging in an arms race and intends to have only a minimum credible deterrent. He says that India's nuclear tests helped "to remove potentially dangerous strategic ambiguities in the region [and] enhanced the strategic space of the country and granted it the needed strategic autonomy." Singh assures that India will respect the South-East Asian Nuclear Weapon Free Zone and is ready to undertake a legal commitment.

—"India Will Not Be the First to Use Nukes," *Strait Times* (Singapore), 3 June 2000, in Lexis-Nexis Academic Universe, 5 June 2000, <http://web.lexis-nexis.com>.

1 June 2000

The Atomic Energy Regulatory Board (AERB) authorizes the Nuclear Power Corporation NPC to operate Unit 3 of the Rajasthan Atomic Power Station (RAPS) for three months. The unit will become fully operational after the AERB assesses the reactor's performance during this period. The unit has a 220MW capacity.

—"Indian Nuclear Power Plant Goes Fully Commercial," Xinhua General News Service, 1 June 2000, in Lexis-Nexis Academic Universe, 2 June 2000, <http://web.lexis-nexis.com>.

30 May 2000

Russian Atomic Energy Ministry's official Mikhail Ryzhov says that the recognition of the nuclear status of India and Pakistan is "inevitable." He remarks that "India and Pakistan can no longer be considered non-nuclear weapon states, even though they still have this status under the Non-Proliferation Treaty. This situation is very unnatural and must be redressed." He points out that nuclear status recognition is crucial for involving India and Pakistan in export control regimes. He adds, however that nuclear status of both countries "has to be recognized in such a way

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that it does not promote and encourage further proliferation of nuclear weapons in the world."

—"Recognize India as Nuclear Weapon State: Russian Nuke Official," Press Trust of India, 30 May 2000, in Lexis-Nexis Academic Universe, 5 July 2000, <http://web.lexis-nexis.com>; Vladimir Radyuhin, "Legalize India's N-Status, Says Russia," *Hindu* (Chennai), 31 May 2000, in Lexis-Nexis Academic Universe, 4 September 2000, <http://web.lexis-nexis.com>.

30 May 2000

A Department of Atomic Energy (DAE) statement on the performance of the industrial and public sector units during 1999-2000 indicates a "five-year high" production levels for heavy water plants at Tuticorin, Kota, Thal, Hazira and Manuguru.

—"DAE Units Achieve Record Production," Press Trust of India, 30 May 2000, in Lexis-Nexis Academic Universe, 5 July 2000, <http://web.lexis-nexis.com>.

12 May 2000

Prime Minister Atal Bihari Vajpayee says that despite numerous meetings between the nuclear weapon states, no tangible results have been achieved so far. He remarks that India will continue to struggle towards universal nuclear disarmament while maintaining a credible minimum deterrent. He reiterates that India's nuclear tests were purely defensive in nature. According to Vajpayee, his government authorized the tests "with full knowledge" that if India did not test at that time, its "neighbor" would have proceeded with the tests anyway.

—"India: Minimum N-Deterrent Vital: PM," *Hindu* (Chennai), 13 May 2000, in Lexis-Nexis Academic Universe, 5 September 2000, <http://web.lexis-nexis.com>.

12 May 2000

In a statement on the anniversary of India's nuclear tests, India's ruling National Democratic Alliance (NDA) states that the tests made the country "stronger, more self-confident and [gave it] a higher global status than before." According to the statement, the economic sanctions had no impact on India and the world "has accepted the view that India has the right to defend itself the way we think best."

—"India's Nuclear Power Status Has Given It High Global Standing," Press Trust of India, 12 May 2000, in Lexis-Nexis Academic Universe, 5 July 2000, <http://web.lexis-nexis.com>.

11 May 2000

In an interview to Doordarshan television network, India's National Security Advisor Brajesh Mishra says that the main objective of the nuclear tests in May 1998 was "to ensure India's security [and] to give a sense of self-confidence to the nation." He adds that the effort to build a consensus on the Comprehensive Test Ban Treaty (CTBT) issue will continue but notes that "it would be impossible to give [a] specific timeframe" for this development. According to Mishra, the NPT is "not relevant at all" for India. He remarks that India nevertheless followed some objectives of the NPT such as maintaining rigid export controls on nuclear technology and materials.

—"India to Go Ahead with Minimum Credible Nuclear Deterrence," BBC Monitoring South Asia, 11 May 2000, in Lexis-Nexis Academic Universe, 15 May 2000, <http://web.lexis-nexis.com>.

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9 May 2000

Addressing the Indian Parliament, Minister of External Affairs Jaswant Singh says that India's nuclear arsenal is defensive and India will not forego minimum credible deterrent, yet it will not engage in an arms race. He adds that India cannot join the NPT as a non-nuclear weapon state. Singh remarks that India is working on a number of initiatives calling for "de-alerting nuclear weapons as a means of reducing the risk of accidental or unauthorized use."

—"India Rejects Demands for Rollback of Nuclear Weapons," Xinhua News Agency, 9 May 2000, in Lexis-Nexis Academic Universe, 10 May 2000, <http://web.lexis-nexis.com>.

8 May 2000

US Assistant Secretary of State for South Asia Karl Inderfurth says that the United States will recommend "immediate removal" of sanctions imposed on India by G-8 countries if India signs Comprehensive Test Ban Treaty (CTBT).

—"US to Unfreeze Loans if India Signs CTBT," *News International* (Islamabad), 8 May 2000, www.jang.com.pk.

1 May 2000

Addressing scientists in Mumbai, former Atomic Energy Commission (AEC) chairman P.K. Iyengar says that further testing is required if India is to maintain a credible nuclear deterrent. Iyengar further notes that India must test a neutron bomb prior to considering signing the Comprehensive Test Ban Treaty (CTBT).

—"India Should Test Neutron Bomb, Says AEC Ex-Chief," *Times of India* (Mumbai), 1 May 2000, in Lexis-Nexis Academic Universe, 11 March 2001, <http://web.lexis-nexis.com>; "India Must Test N-Bomb Before Signing CTBT," *Hindu* (Chennai), 2 May 2000, <http://hinduonline.com>.

May 2000

Bhabha Atomic Research Center (BARC) director Anil Kakodkar forms an "unnamed safety panel" to monitor BARC's operations. The panel is to replace the AERB oversight, which was eliminated by the AEC order on 25 April 2000.

—"N-Arms Programme off AERB Jurisdiction," *Hindu* (Chennai), 2 June 2000, <http://hinduonline.com>.

30 April 2000

India's National Security Advisor Brajesh Mishra says that the government is determined to have a survivable deterrent for India, yet it does not intend to match China's capabilities.

—Manoj Joshi, "India Must Have Survivable N-Arsenal," *Times of India* (Mumbai), 30 April 2000, in Lexis-Nexis Academic Universe, 10 March 2001, <http://web.lexis-nexis.com>.

25 April 2000

Atomic Energy Commission (AEC) Chairman R. Chidambaram signs an order placing the Bhabha Atomic Research Center (BARC) outside the scope of the Atomic Energy Regulatory Board's (AERB) monitoring. According to the order, an Internal Safety Committee to be constituted by BARC Director Anil Kakodkar will perform safety and regulatory functions for BARC. Former AERB Chairman A. Gopalakrishnan remarks that "in one stroke, the safety assurance and regulation of the mostly dilapidated BARC facilities has been made the responsibility of those who

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are managing these installations, defeating the very principle of independent external scrutiny which is at the core of any safety regulation." According to Gopalakrishnan, removing BARC facilities from AERB supervision is the only way the government can avoid "external scrutiny" of dismal safety conditions at these installations. The AEC decision contradicts the Convention on Nuclear Safety, which India signed in 1994, regarding the separation of nuclear regulatory organization from the government organizations that have a stake in promoting nuclear power. —Ramola Talwar Badam, "BARC Now Freed of Regulatory Control," *Asian Age* (New Delhi), 30 May 2000, www.asianage.com; A.S. Paneerselvan, "Radioactivity," *Outlook*, 19 June 2000, <http://outlookindia.com>.

23 April 2000

The *Asian Age* (New Delhi) reports that Central Bureau of Investigation (CBI) has begun an investigation of "irregularities and misuse" at the Bhabha Atomic Research Center's (BARC) facilities. The report mentions complaints by scientists that apart from nuclear tests at Pokhran, BARC has no other significant achievements to its credit and "most of scientific, technical and administrative staff are promoting their own personal businesses. The quality of research degenerated totally." Commenting on the issue, BARC director Anil Kakodkar dismisses the allegations as "baseless and untrue."

—Haima Purushottam, "CBI to Investigate 'Misuse' of BARC Labs," *Asian Age* (New Delhi), 23 April 2000, www.asianage.com.

22 April 2000

In an address to the Aeronautical Society of India at Hyderabad, Atomic Energy Commission (AEC) chairman R. Chidambaram says that in developing countries like India "there is a big shortfall between demand and supply of [power]. Only nuclear energy can bridge this gap." He remarks that nuclear energy is "imperative" for such countries and demand for it is likely to surge "very soon."

—"Bigger N-Energy Thrust Soon: R. Chidambaram," *Times of India* (Mumbai), 24 April 2000, <http://timesofindia.indiatimes.com>.

18 April 2000

In a report presented to the Lok Sabha (lower house of parliament), the Parliamentary Standing Committee on Energy states that the goal of 20,000MW of nuclear power by 2020 is not feasible due to the cost of the nuclear program, "limited operating base and ability of the Nuclear Power Corporation of India Ltd (NPC) to raise internal resources." The committee recommends that "long-term maturity loans be made available to NPC at reasonable rates of interest [due to the latter's] difficulty in substantial market borrowings short maturity period [of NPC's bonds] compared to the gestation period [of nuclear power projects], which varies between 54 and 150 months for building a nuclear power plant."

—"India: 'Nuclear Target Not Realistic'," *Business Line* (Chennai), 19 April 2000, in Lexis-Nexis Academic Universe, 10 March 2001, <http://web.lexis-nexis.com>.

28 March 2000

Atomic Energy Commission (AEC) Chairman R. Chidambaram says India will not use its nuclear program against any country. He remarks that it will utilize nuclear energy for power generation, agriculture, industry and medicine. He adds that for a developing country the nuclear tests are "a blessing in disguise."

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—"India's Nuclear Power Only for Self-Defense: Chidambaram," Press Trust of India, 28 March 2000, in Lexis-Nexis Academic Universe, 7 September 2000, <http://web.lexis-nexis.com>.

23 March 2000

US Commerce Secretary William Daley says that India needs to sign the Comprehensive Test Ban Treaty (CTBT) if it wants to have the sanctions removed completely.

—"Sign CTBT, Curbs Will Go: US," *Hindustan Times* (New Delhi), 23 March 2000, www.hindustantimes.com.

22 March 2000

During his visit to India, US President Bill Clinton addresses the Indian parliament. Broaching the subject of nuclear proliferation, Clinton says, "...only India can determine its own interests. Only India can determine if it will benefit from expanding its nuclear and missile capabilities, if its neighbors respond by doing the same thing. Only India knows if it can afford a sustained investment in both conventional and nuclear forces while meeting its goals for human development." Clinton further adds, "...India's nuclear policies, inevitably, have consequences beyond your borders: eroding the barriers against the spread of nuclear weapons, encouraging others to keep their options open. But if India's nuclear tests shook the world, India's leadership for nonproliferation can certainly move the world." Urging India to join the United States in signing the Comprehensive Test Ban Treaty (CTBT), Clinton also makes the case that New Delhi and Washington should "work to launch negotiations on a treaty to end the production of fissile materials for nuclear weapons, and strengthen export controls."

—Remarks by the US President Clinton to the Joint Session of Indian Parliament, 22 March 2000.

19 March 2000

Hours prior to US President Bill Clinton's arrival in New Delhi, Prime Minister Atal Bihari Vajpayee says that his government "will not take any decision under pressure so far as national security is concerned" and will make independent decisions.

—"No Decision Under Duress: PM," *Hindustan Times* (New Delhi), 20 March 2000, www.hindustantimes.com.

16 March 2000

Unit 2 reactor of the Kaiga Atomic Power Station is declared commercial. This declaration follows successful physics experiments that were conducted at 50 percent and 100 percent power level capabilities.

—Government of India, *Department of Atomic Energy Annual Report: 2000-2001*, Executive Summary available at www.dae.gov.in.

15 March 2000

Responding to a statement by the US Secretary of State Madeleine Albright, the spokesperson for India's Ministry of External Affairs R.S. Jassal says that India and the United States "are now aware of each other's security concerns and naturally some residual differences remain... We have been engaged in a high-level intensive dialogue which was focused on nonproliferation and disarmament and was meant to harmonize the views of India and the United States on these issues. And obviously our dialogue has been predicated on India having a credible minimum deterrent."

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—"India Hopes to Resolve Nuclear Differences with US," *News International* (Islamabad), 16 March 2000, www.jang.com.pk.

14 March 2000

US Secretary of State Madeleine Albright says that the United States does not consider India a direct threat, yet it regards "proliferation as number one security concern."

—"India Hopes to Resolve Nuclear Differences with US," *News International* (Islamabad), 16 March 2000, www.jang.com.pk.

11 March 2000

Speaking at the Indian Institute of Technology, Atomic Energy Commission (AEC) chairman R. Chidambaram says that there was a perfect match between an estimated and actual yield of a 15kt device India exploded in May 1998 due to prior "rigorous computer simulation." According to Chidambaram India can achieve 20,000MW of nuclear power by 2020 "due to an increase in budgetary support in the Ninth Plan and increasing plant load factor."

—"India: Nuclear testing Has Become Less Necessary," *Business Line* (Chennai), 11 March 2000, in Lexis-Nexis Academic Universe, 7 September 2000, <http://web.lexis-nexis.com>.

10 March 2000

Unit 3 of the Rajasthan Atomic Power Station (RAPS) is synchronized to the Northern grid. It later begins commercial operations on 1 June 2000.

—Government of India, *Department of Atomic Energy Annual Report: 2000-2001*, Executive Summary available at www.dae.gov.in.

8 March 2000

The spokesperson of the Ministry of External Affairs R.S. Jassal says that the Indian government has "conveyed our concerns that China's assistance to Pakistan's nuclear and missile program has an adverse impact on regional stability to which [India has] been obliged to respond in a responsible and restrained manner."

—"India Conveys Concern to China," *Dawn* (Karachi), 9 March 2000, www.dawn.com.

6-7 March 2000

Concluding the first Sino-Indian security dialogue, Chinese Foreign Minister Zhu Bangzao asks India to comply with the UN Security Council Resolution 1172 and end its nuclear weapons program. A senior Indian government official says India used the security dialogue to explain its nuclear posture to China and "the Chinese side listened."

—"China Asks India to Renounce Nuclear Weapons as Security Talks Conclude," BBC Monitoring South Asia, 7 March 2000, in Lexis-Nexis Academic Universe, 7 March 2000, <http://web.lexis-nexis.com>; "India Rejects China's Call for Rollback," *Hindustan Times* (New Delhi), 9 March 2000, www.hindustantimes.com.

5 March 2000

Inaugurating the second unit of Kaiga nuclear power station, Prime Minister Atal Bihari Vajpayee says that India is committed to a timebound elimination of nuclear weapons. Yet he adds that India will "continue to be guided by the imperative of the country's strategic autonomy and the need to maintain a credible minimum deterrent" until all nuclear weapons are dismantled.

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—"India to Have Minimum Nuclear Deterrent: Vajpayee," Deutsche Presse-Agentur, 5 March 2000, in Lexis-Nexis Academic Universe, 5 March 2000, <http://web.lexis-nexis.com>.

3 March 2000

In an interview to the *Times of India* (Mumbai), former Atomic Energy Commission (AEC) Chairman M.R. Srinivasan says that India should conduct more nuclear tests, if needed, so that its nuclear scientists could "design more compact nuclear weapons with improved yields." He argues that India should not foreclose its nuclear options because it carried out only one thermonuclear test. Yet Srinivasan admits that the scientists accumulated sufficient data from the six nuclear tests.

—Srinivas Laxman, "India Must Continue N-Weapon Tests, Says Ex-chief of AEC," *Times of India* (Mumbai), 3 March 2000, in Lexis-Nexis Academic Universe, 11 March 2000, <http://web.lexis-nexis.com>.

1 March 2000

Nuclear Power Corporation (NPC) chairman Y.S.R. Prasad says that Koodankulam project with Russia is a part of NPC's effort to accelerate nuclear power generation capacity to 7,000MW by 2007. He notes that Koodankulam project has an estimated cost of USD 2.5 billion, 60 percent of which will be financed by a long-term loan from Russia.

—"India: Russian Loan Package for Nagarjuna Power Co. Project," *Business Line* (Chennai), 2 March 2000, in Lexis-Nexis Academic Universe, 10 March 2000, <http://web.lexis-nexis.com>.

March 2000

The report "Fissile Material Cut-Off Treaty and Options for India," prepared by Bangalore-based National Institute of Advanced Studies, states that India's current capacity to produce plutonium is limited and "there is a need to augment this capacity quickly to hold enough plutonium stockpile." The report notes, however, that India will be unable to reach stockpile level held by nuclear weapon states. Further, the report mentions that India has been successful in "not classifying spent fuel as waste under the nuclear waste convention. This position should not be changed until there is evidence of true disarmament and global access for India to sources of natural uranium is made possible without unacceptable conditions." Finally, the report states India's nuclear program is targeted at China, not Pakistan.

—Srinivas Laxman, "India Lacks Plutonium to Maintain N-Deterrent: Report," *Times of India* (Mumbai), 7 March 2000, in Lexis-Nexis Academic Universe, 11 March 2000, <http://web.lexis-nexis.com>.

29 February 2000

While announcing a budget for 2000-2001, Finance Minister Yashwant Sinha says there will be a 28.2 percent increase in military spending in the new fiscal year.

—Barry Bearak, "India Increases Its Military Budget by 28 Percent," *New York Times*, 1 March 2000, in Lexis-Nexis Academic Universe, 1 March 2000, <http://web.lexis-nexis.com>; Atul Aneja, "Army Gets Lion Share of Funds," *Hindu* (Chennai), 1 March 2000, <http://hinduonline.com>; "India: Defense Allocations Higher, But Necessary," *Business Line* (Chennai), 8 March 2000, in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

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24 February 2000

US Deputy Secretary of State Strobe Talbott says that while the United States is ready for a new phase of relations with India, it sees four "unfinished" issues: the Comprehensive Test Ban Treaty (CTBT), the Fissile Material Cut-Off Treaty (FMCT), India's defense posture of a credible minimal deterrence, and Indo-Pakistan relations. Talbott remarks that until the United States and India are able to "find more common ground on the nonproliferation area, there is going to be some significant, necessary limitations, notably including the military sphere and we hope that is not going to be permanent condition."

—N.C. Menon, "Talbott: Clinton's India Visit to Open New Chapter in Ties," *Hindustan Times* (New Delhi), 26 February 2000, www.hindustantimes.com; Sridhar Krishnaswami, "N-Issue at the Center of Indo-US Ties: Talbott," *Hindu* (Chennai), <http://hinduonline.com>.

15 February 2000

The Indo-French Forum concludes its two-day session in New Delhi today. The French co-chairman Jean Francois Poncet says "there was already some work going on" the bilateral cooperation in the field of nuclear safety and basic atomic research. The project under discussion is the sale of French nuclear reactors to accelerate nuclear power generation in India. Yet he remarks that there are "difficulties" along the way.

—Raja Mohan, "India, France Explore N-Cooperation," *Hindu* (Chennai), 16 February 2000, <http://hinduonline.com>.

15 February 2000

India's Minister of External Affairs Jaswant Singh says that prior to making a decision on the Comprehensive Test Ban Treaty (CTBT), the government intends to hold a referendum.

—"India's Stand on CTBT Not Linked with Clinton's Visit," Pakistan Newswire, 15 February 2000, in Lexis-Nexis Academic Universe, 5 July 2000, <http://web.lexis-nexis.com>.

14 February 2000

In an interview to the *Hindu* (Chennai), French Foreign Minister Hubert Vedrine says that France is ready "to increase cooperation in the field of civilian nuclear technology." Yet to move in this direction, India has to "show it is ready to go along with the international (nuclear) regimes."

—Raja Mohan, "Signing CTBT Will Help," *Hindu* (Chennai), 15 February 2000, <http://hinduonline.com>.

6 February 2000

Addressing a conference in Munich, India's National Security Advisor Brajesh Mishra underscores that India has a no-first-use nuclear policy and does not intend to match China's nuclear arsenal.

—"21st Century Will Be the Asian Century: Indian Official," Agence France Presse, 6 February 2000, in Lexis-Nexis Academic Universe, 6 February 2000, <http://web.lexis-nexis.com>; "India Won't Play Nuclear Catch-up with China, Official Says," Deutsche Presse-Agentur, 6 February 2000, in Lexis-Nexis Academic Universe, 6 February 2000, <http://web.lexis-nexis.com>; "We're Not Trying to Catch up with China," *Times of India* (Mumbai), 7 February 2000, in Lexis-Nexis Academic Universe, 5 March 2000, <http://web.lexis-nexis.com>.

26 January 2000

In an interview with the Russian newspaper *Izvestia*, Prime Minister Atal Bihari Vajpayee says that rejection of the

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Comprehensive Test Ban Treaty (CTBT) by the US Senate "has had an impact on domestic opinion in India." He adds that India expects all 44 countries required to sign the treaty to do so unconditionally, adding that India will not block the treaty's entry into force. He remarks that NPT is "discriminatory and flawed" and that India cannot join it as a non-nuclear weapon state.

—"NPT Discriminatory: PM," *Hindu* (Chennai), 27 January 2000, <http://hinduonline.com>.

24 January 2000

India's Defense Minister George Fernandes says that US Senate's rejection of the Comprehensive Test Ban Treaty (CTBT) has "resulted in a treaty sliding to coma." He reiterates that India is not going to use its nuclear arsenal against non-nuclear weapon states.

—"Indian Defense Minister Says CTBT in a 'Coma'," Agence France Presse, 24 January 2000, in Lexis-Nexis Academic Universe, 24 January 2000, <http://web.lexis-nexis.com>.

18-19 January 2000

US Deputy Secretary of State Strobe Talbott and India's Minister of External Affairs Jaswant Singh meet in London to resume the dialogue "on security, nonproliferation, disarmament and related issues."

—Press Release Issued at the End of the 10th Round of Indo-US Talks, 19 January 2000, Embassy of India, Washington, DC, www.indianembassy.org.

14 January 2000

In an interview to the *Hindu* (Chennai), US Deputy Secretary of State Strobe Talbott says that the United States "fully" recognizes that it is "a sovereign right [of the Indian government] to make decisions on what sort of weapons and force posture are necessary for the defense of India and Indian interests." He remarks that Washington needs an assurance that New Delhi is not going to seek "an open-ended arms competition, but only the minimum necessary to ensure Indian security." Yet Talbott underscores that a state can sign both the Comprehensive Test Ban Treaty (CTBT) and the Fissile Material Cut-Off Treaty (FMCT) "without giving up the ability to possess nuclear weapons." Strobe Talbott and India's Minister of External Affairs Jaswant Singh are to restart the security dialogue in London on 18 and 19 January.

—"US Recognizes Reality of Nuclear India: Talbott," Agence France Presse, 14 January 2000, in Lexis-Nexis Academic Universe, 14 January 2000, <http://web.lexis-nexis.com>; K.K. Katyal, "India: Jaswant, Talbott Talks to Focus on South Asia," *Hindu* (Chennai), 14 January 2000, in Lexis-Nexis Academic Universe, 5 March 2000, <http://web.lexis-nexis.com>; Raja Mohan, "Early Solution to Nuclear Issues Will Help: Talbott," *Hindu* (Chennai), <http://hinduonline.com>.

11 January 2000

Japan's Chief Cabinet Secretary Mikio Aoki urges India's Defense Minister George Fernandes to sign the Comprehensive Test Ban Treaty (CTBT) so that Japan can consider resumption of the Official Development Assistance (ODA) to India.

—"ODA Loans Only after India Signs CTBT: Japan," *Hindu* (Chennai), 12 January 2000, www.hinduonline.com; "Japan Urges India to Join CTBT," Jiji Press Ticker Service, 11 January 2000, in Lexis-Nexis Academic Universe, 11 January 2000, <http://web.lexis-nexis.com>.

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7 January 2000

The Congress Working Committee asks the BJP-led government to clarify its position on the Comprehensive Test Ban Treaty (CTBT) before it searches for national consensus on the issue.

—"Indian Government Asked to Clarify Position on CTBT," *Times of India* (Mumbai), 7 January 2000, in FBIS Document FTS20000107000141, 7 January 2000.

5 January 2000

Defense Minister George Fernandes announces India's doctrine of fighting 'limited conventional wars under nuclear conditions' at a seminar in New Delhi. According to Fernandes, "Nuclear weapons have not made war obsolete; they simply imposed another dimension on the way warfare was conducted...elementary reading would tell us that 30-years ago two nuclear armed neighboring countries - China and the Soviet Union - had fought a bitter war across their borders. So the issue is...that conventional war remained feasible, though with definite limitations, if escalation across the nuclear threshold was to be avoided." Drawing on China's doctrine of "local border wars," Fernandes emphasizes that henceforth limited conventional wars would be the wars of the future and the Indian military should prepare to fight and win such wars. Fernandes warns Pakistan against continuing its "proxy war" in Kashmir and threatens that Islamabad's nuclear weapons will not deter India from fighting back.

—Inaugural Address by Raksha Mantri at Habitat Center, New Delhi, "The Challenges of Limited War: Parameters and Options," National Seminar organized by IDSA, 5 January 2000.

1 January 2000

India and Pakistan exchange lists of nuclear installations under the agreement signed in 1988.

—"Pakistan, India Exchange Lists on Nuclear Installations," Deutsche Presse-Agentur, 1 January 2000, in Lexis-Nexis Academic Universe, 1 January 2000, <http://web.lexis-nexis.com>.

Early January 2000

The Director General, Defense Planning Staff, in the Ministry of Defense, produces a paper for the Chairman, Chiefs of Staff Committee, which casts doubts on the government's proposed move to sign the Comprehensive Test Ban Treaty (CTBT). The paper questions whether India has the capability to produce a fission device of more than 50kt yield; and if this were indeed the case, then it would have negative repercussions on the credibility of India's proposed nuclear deterrent. The paper outlines the military's requirement for a 200-250kt thermonuclear device; which should be tested to as proof of an "effective" credible minimum deterrent. The military also doubts whether nuclear weapons can be deployed in the absence of further testing. The military's misgivings are conveyed by to the defense ministry.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 431-432.

January 2000

Former Atomic Energy Commission (AEC) Chairman P.K. Iyengar has separate meetings with India's National Security Advisor, Brajesh Mishra, Foreign Minister Jaswant Singh, and Chief of Army Staff, Ved Malik. Iyengar advises them against signing the Comprehensive Test Ban Treaty (CTBT) and makes a case for the resumption of nuclear testing. Iyengar makes the case that additional tests are necessary to validate the devices tested in 1998.

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Further, India's thermonuclear test was most likely a dud; without tests, Indian scientists will be unable to rectify the design flaws, or modify or refine it. Neither would Indian scientists be able to improve the thermonuclear device's 'power-to-yield' characteristics, or upscale the design to generate larger yields. Iyengar also argues that in the absence of further testing, India will also be unable to design newer types of nuclear warheads; now would it have sufficient data for benchmarking computer simulations.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 423.

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1999

1999

India opens its first Solid Storage Surveillance Facility (S3F) at Tarapur. A S3F allows for the long term storage of high-level radioactive waste in a deep geographical repository. India is the fourth country to possess such a facility. The Waste Immobilization Project (WIP) at Trombay commissions an indigenously designed and manufactured vitrification furnace. A vitrification furnace allows for the immobilization of highly active radioactive waste into glass. The WIP at Trombay is scheduled to be completed soon, and the WIP at Kalpakkam also makes progress.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(5).

1999

The Department of Atomic Energy (DAE) reports that a facility for the reprocessing of uranium-233 from thorium rods irradiated at CIRUS and DHRUVA research reactors is reaching completion.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(5).

1999

The Nuclear Fuel Complex (Hyderabad) commissions three new facilities: the New Uranium Oxide Fuel Project, the New uranium Fuel Assembly Project, and the New Zircaloy Fabrication project.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(5).

1999

The Heavy Water Board (HWB) reports the overall performance and safety record of India's heavy water facilities were "excellent." The heavy water production facilities at Tuticorin, Baroda and Kota completed more than 8.6, 9.6, and 5.3 million hours of continuous production, respectively.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(4).

1999

The Department of Atomic Energy (DAE) reports that the prototype fast breeder reactor (PFBR) is making significant progress in the design and the development of its components. The fast breeder test reactor (FBTR) operated successfully at 8MW with its plutonium-carbide fuel.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(3).

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1999

According to the Department of Atomic Energy's (DAE) annual report, India's 10 nuclear power facilities performed at nearly 80 percent of maximum generating capacity; up from 75 percent during the 1998-99 period.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1(2).

24 December 1999

The Unit 3 reactor of the Rajasthan Atomic Power Project (RAPP) achieves criticality. The DAE claims that the 220MWe reactor will be synchronized to the grid "in the near future."

—Government of India *Department of Atomic Energy Annual Report: 1999-2000*, pp. 1.3, 3.6, Executive Summary, www.vigyan.org.in.

21 December 1999

A spokesperson for the Ministry of External Affairs says India will have a credible minimum nuclear deterrent "at the level it chooses" even if it signs the Comprehensive Test Ban Treaty (CTBT). The spokesperson says India's "dialogue with key interlocutors is predicated on the fact that India will have a credible minimum deterrent" and this issue "needs no further explanation" being a "self-evident truth."

—"Indian Government Says to Have Credible Nuclear Deterrent Even if It Signs CTBT," *Indian Express* (Mumbai), 22 December 1999, <http://expressindia.com>; "India Reserves the Right to Determine Deterrent," *Hindu* (Chennai), 22 December 1999, www.hinduonline.com.

20 December 1999

The *Times of India*, citing an official from the US Department of State, reports that over a period of time, the United States will make further "adjustments to the entities list both in terms of the numbers as well as coverage of the licensing elements."

—T.V. Parasuram, "US Will Reduce Entities List Further," *Times of India* (Mumbai), 22 December 1999, <http://timesofindia.indiatimes.com>.

17 December 1999

The US Department of Commerce removes 51 organizations from the list of 200 Indian entities sanctioned in November 1998. These entities will now be able to import non-sensitive products that do not require an export license from the United States. Roger Majak, Assistant Commerce Secretary for Export Administration, says the action was based on a consensus decision to focus the sanctions more narrowly "on those Indian entities most directly involved in proliferation activities of concern." Mr. Majak states that "the US policy of denial for dual-use items, controlled for nuclear and missile technology reasons to all Indian and Pakistani entities, remains unchanged." Ordinary computers are not treated as dual-use items anymore and will be taken off the list. Majak also says there will be further revisions of the list of both the entities and the products. The spokesperson of the Ministry of External Affairs welcomes the decision expressing hope for the "complete abolition of this restrictive list."

—"US Lifts Curbs on 51 Indian Entities," *Hindustan Times* (New Delhi), 18 December 1999, www.hindustantimes.com.

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9 December 1999

Senior Advisor for arms control and national security in the US Department of State John Holum says India's security requirements are "best served without a nuclear capability." He says the United States does not accept India's nuclear capability. According to Holum, even though the United States does not have "the ability to judge" India's security requirements, its assessments of the regional situation do not imply that New Delhi needs to have a nuclear capability. Holum says the United States is still looking for progress on the four benchmarks specified in the course of the Indo-US dialogue. The lifting of the remaining sanctions depends on this progress. Holum states the benchmarks "remain integral to US policy." According to Holum, India is an "indispensable party" to ensure the entry into force of the Comprehensive Test Ban Treaty (CTBT).

—Ramesh Chandran, "US Hasn't Accepted India's Need for N-Deterrent: Holum," *Times of India* (Mumbai), 11 December 1999, <http://timesfindia.indiatimes.com>.

December 1999

After having worked on the development of an indigenous nuclear-powered submarine or Advanced Technology Vessel (ATV) for about two decades, the Indian defense scientific establishment initiates preliminary discussions with France and Russia on possible assistance in the design and development of the nuclear reactor for the ATV. The *Asian Age* reports that the response from France was not very enthusiastic. This issue was discussed during the meeting of the Indo-Russian group on military-technical cooperation in November 1999. According to the *Asian Age* report, the Defense Research and Development Organization (DRDO), the Department of Atomic Energy (DAE) and the Indian Navy estimate that the construction and testing of a "compact and lightweight nuclear reactor with a power output of about 90MW" cannot be completed before 2004, the target year for the induction of nuclear-powered submarine.

—Rezaul H. Laskar, "India Expediting Advanced Technology Vehicle," *Asian Age* (New Delhi), 10 December 1999, p. 1-2; FBIS Document FTS19991210000106, 10 December 1999.

29 November 1999

In an interview with the *Hindu*, Foreign Affairs Minister Jaswant Singh reiterates the key points behind India's nuclear policy and doctrine. Singh says India "shall maintain a minimum nuclear deterrent and shall undertake necessary measures to ensure its credibility...the principal role of nuclear weapons is to deter their use by an adversary. For this India needs only that strategic minimum which is credible. With the policy of 'retaliation only,' survivability becomes critical to ensure credibility. This 'minimum,' however, cannot be a fixed physical quantification; it is a dynamic concept rooted in the strategic environment, technological imperatives...." Addressing concerns that India is seeking a triad nuclear force, Singh says, "...it is premature to talk of an Indian 'triad.' R&D programs will certainly continue, aimed at enhancing survivability and thus, credibility," but a 'triad is not a pre-requisite for credibility. Singh also elaborates on India's 'no-first-use' doctrine explaining that "...our nuclear assets are limited and consistent with 'no-first-use;' we have ensured that these procedures do not tempt an adversary to pre-emption but strengthen deterrence by underlining the political resolve for effective retaliation." Singh adds, "...we have rejected notions of 'launch on warning postures' that lead to maintaining hair trigger alerts, thus increasing the risks of an unauthorized launch." With regard to the question of tactical nuclear weapons, Singh adds, "...we do not see nuclear weapons as weapons of war fighting. In fact, India sees them only

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as strategic weapons, whole role is to deter use by an adversary."

—"India Not to Engage in a N-Arms Race: Jaswant," *Hindu* (Chennai), 29 November 1999, www.hinduonline.com.

26 November 1999

Speaking at Japan Institute of International Affairs, the Minister of External Affairs of India Jaswant Singh says that India's unilateral voluntary nuclear testing moratorium announced after a series of nuclear tests in May 1998 is a "de-facto acceptance of Comprehensive Test Ban Treaty (CTBT)." He says that "India's national identity and security could not be negotiated nor could it be lost to globalization." Singh asserts that India conducted the tests due to the nuclear developments in Pakistan.

—"India's Moratorium is De-facto Acceptance of CTBT," *Hindustan Times* (New Delhi), 26 November 1999, www.hindustantimes.com.

17 November 1999

The ninth round of Indo-US talks concludes. The Joint Press Statement indicates that no progress was made during the talks. The two sides concentrated on the four "benchmarks": Comprehensive Test Ban Treaty (CTBT), Fissile Material Cut-Off Treaty (FMCT), export controls, and defense posture. The two sides agreed on the importance of these issues and "the need to make tangible progress." They have also agreed that "the purpose of the talks is to lay the foundation of the broad-based forward looking relationship between the United States and India." The statement indicates the hope that the visit of the President Clinton to India next year will "provide the occasion to significantly improve mutual understanding and cooperation." According to the Joint Statement, the next round of Indo-US talks shall take place in January 2000.

—"Joint Statement on the Conclusion of Indo-US Bilateral Talks," 17 November 1999, Embassy of India, Washington, DC, www.indianembassy.org.

16 November 1999

The ninth round of Indo-US talks begins at the Indian High Commission in London. The agenda for the meeting is not made public. The Indian delegation consists of the Minister of External Affairs Jaswant Singh, Foreign Secretary K. Raghunath, Foreign Secretary-designate Lalit Mansingh, and the Ministry of External Affairs Secretaries Alok Prasad and Rakesh Sood. The US delegation includes Deputy Secretary of State Strobe Talbott, Assistant Secretary of State for South Asian Affairs Karl Inderfurth, and other officials.

—Thomas Anrahan, "Jaswant, Talbott Hold Talks," *Hindu* (Chennai), 17 November 1999, www.hinduonline.com.

10 November 1999

Senior Advisor for Arms Control and National Security in the US Department of State John Holum says India and Pakistan must adhere to the Comprehensive Test Ban Treaty (CTBT) despite the failure of the US Senate to ratify the treaty. Holum adds that the United States will continue its efforts to "encourage signature and ratification of the Treaty by both countries."

—"US Wants India, Pakistan to Accede to CTBT," *News Today*, 10 November 1999, www.india-today.com.

November 1999

India and the United States resume bilateral military contacts. India's Ambassador to the United States Naresh

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Chandra visits the headquarters of the Commander-in-Chief of the Pacific Fleet.

—"India, US Resume Military Contacts," *Hindu* (Chennai), 6 November 1999, www.hinduonline.com.

Late October 1999

External Affairs Minister Jaswant Singh says that India determines its policy based on its national interests and its attitude towards the Comprehensive Test Ban Treaty (CTBT) is not dependent on the US Senate vote. This is not the reason for India to resume testing. However, the US rejection of the treaty proves the complexity of this issue. Singh reiterates that for India to proceed with the CTBT, "a widespread national consensus" is necessary. According to Singh, India's voluntary testing moratorium is "not bound by time or conditions." Speaking of Indo-US dialogue, Singh says that the eighth round was "the most intense, in-depth" the United States and India "had in the past many decades" and it "must resume at the earliest."

—V. Shankar Aiyar, "They Must Move the Bus Back to Lahore," *India Today*, 1 November 1999, www.india-today.com.

29 October 1999

The Safety Review Committee of Operating Plants (SARCOP) of the Atomic Energy Regulatory Board (AERB) rules that accidents at nuclear power plants, like the one that took place in Japan recently, are unlikely in India. Atomic Energy Commission (AEC) chairman R. Chidambaram says the AERB has nevertheless called for re-examination of relevant plants as "a measure of abundant caution." Addressing the scientists and technologists at the Bhabha Atomic Research Center (BARC), Chidambaram says the safety record of Indian nuclear plants has been internationally recognized and "no directive of the AERB has ever been violated." Referring to a report (by A. Gopalakrishnan) stating that "India is likely to face a nuclear accident in not too distant future," Chidambaram says that "such a statement made without any scientific basis is a symptom of the technological diffidence in some persons who consider that, as a nation, India is not capable of dealing with high technology." According to Chidambaram, "safety is a matter of culture and our continuous and strong emphasis on it, both in design and operation, has paid rich dividends." Chidambaram says AERB "stringently monitors the safety record of India's nuclear facilities" and Nuclear Power Corporation "has the track record of 150 reactor years of safe operation." —"Panel to Re-examine N-Plants for Safety," *Hindu* (Chennai), 29 October 1999, www.hinduonline.com.

26 October 1999

US President Bill Clinton signs the Defense Appropriations Act for the fiscal year 2000. The bill empowers him to waive economic sanctions contained in sections 101 and 102 of the Arms Export Control Act (except for sub-sections (B), (C), and (G) dealing with the technologies directly contributing to the development of nuclear weapons and dual-use items), section 2(b)(4) of the Export Import Bank Act or section 620E(e) of Foreign Assistance Act, imposed on India and Pakistan in the aftermath of May 1998 nuclear tests. The waiver of the sanctions under sub-sections (B), (C), and (G) of section 102 of the Arms Export Control Act is possible if the president certifies that such a waiver will be in the national security interests of the United States. The waiver shall be terminated if India or Pakistan "detonates a nuclear explosive device after the date of enactment of this Act or otherwise takes such action which would cause the president to report pursuant section 102(b)(1) of the Arms Control Act." The Act stipulates that the president submits "both classified and unclassified report" listing the amended list of Indian and Pakistani entities to remained sanctioned within 60 days of enactment of this Act.

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—Department of Defense Appropriations Act, 2000, Section 9001, "Waiver of Certain Sanctions Against India and Pakistan," *Thomas Legislative Information on the Internet*, <http://thomas.loc.gov>; "Clinton gets the Authority to Waiver Sanctions," *Hindustan Times* (New Delhi), 27 October 1999, www.hindustantimes.com; Sridhar Krishnaswami, "US Economic Sanctions Against India Waived," *Hindu* (Chennai), 29 October 1999, www.hinduonline.com.

23 October 1999

The US Secretary of Energy Bill Richardson is to visit India between 26-28 October. He says that while the United States continues to believe "that India is better off without nuclear weapons," it recognizes "that India feels it needs such capability." Richardson says the United States is disappointed with the lack of concrete steps undertaken by India on her pledges. According to Richardson, the United States is "encouraged that India plans to proceed with efforts to build a consensus for the test ban treaty, despite the failure of the US Senate to ratify it." Richardson says he plans to discuss with the Indian government "a number of energy cooperation ventures" and plans to reach "some agreements in several areas." Richardson suspects "there will be some discussions on nuclear power development."

—C.K. Arora, "US Links Clinton Visit to Nonproliferation Dialogue," *Rediff On The Net*, 23 October 1999, www.rediff.com.

21 October 1999

Former Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says, "India is likely to face a serious nuclear accident in not too distant future." According to Gopalakrishnan, a report prepared by AERB in 1995 listed 130 defects in various nuclear installations that "did include some identified problems related to reprocessing plants." Gopalakrishnan says the report had "urgently called for modification of emergency core cooling systems (ECCS)" vital to prevent melting of the reactor core in the event of breakdown in the circulation of the primary coolant. According to Gopalakrishnan, excessive secrecy in the Department of Atomic Energy (DAE) and inability of AERB to function independently hampered the safety of nuclear installations in India. He says, the people may not be aware of an accident taking place "unless the roof of a plant blows out or a visible fire rages there." Thus far India has experienced a burst of the primary coolant pipe in Tarapur reactor in 1979, explosion at the turbine building in Narora due to the leakage of hydrogen in 1993, cable fire at Rajasthan atomic power plant in 1985, the leakage of the heavy water at Madras reactor in June 1986, August 1988 and March 1999, the collapse of the concrete dome at Kaiga atomic plant in May 1994, "an incident which could have been a disaster had it happened while the reactor was running."

—"India May Face Nuclear Accident, Warns Expert," *Hindustan Times* (New Delhi), 22 October 1999, www.hindustantimes.com.

21 October 1999

During a video-conference from New Delhi, the US Ambassador to India Richard Celeste says India may follow the US example and sign the Comprehensive Test Ban Treaty (CTBT) without ratification. Celeste says that India should not sign the treaty just "to please the United States" but "because the treaty helps to secure India's national interest."

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—"India May Sign, not Ratify CTBT: Celeste," *Times of India* (Mumbai), 21 October 1999, <http://timesofindia.indiatimes.com>.

20 October 1999

The Principal Secretary to the Prime Minister and National Security Adviser Brajesh Mishra leaves for the United States to discuss bilateral issues, including the developments in Pakistan and the Comprehensive Test Ban Treaty (CTBT).

—"Brajesh Mishra Leaves for Washington," Rediff On The Net, 20 October 1999, www.rediff.com.

14 October 1999

Minister of External Affairs Jaswant Singh states that the military coup in Pakistan and US rejection of the Comprehensive Test Ban Treaty (CTBT) notwithstanding, India will not change its stand on the CTBT issue and will not block the treaty's entry into force. Singh says India remains committed to the voluntary moratorium announced after the nuclear tests last year. The official spokesperson for India's Ministry of External Affairs (MEA) states that proceeding with the treaty requires "building a national consensus in the countries concerned, including India."

—"Jaswant Singh Rules Out Any Change in Stand on CTBT Issue," 14 October 1999, *Hindustan Times* (New Delhi), 14 October 1999, www.hindustantimes.com; "India to Help Evolve Consensus on CTBT: Jaswant," Rediff On The Net, 14 October 1999, www.rediff.com; "Senate Debate Vindicates India's Position on CTBT," *Hindustan Times* (New Delhi), 14 October 1999, www.hindustantimes.com.

6 October 1999

Assistant Secretary of State for South Asian Affairs Karl F. Inderfurth speaks at the Paul H. Nitze School of Advanced International Studies (SAIS) in Washington, DC. Inderfurth talks of the dangers of nuclear and missile proliferation in South Asia and about the tests conducted by India and Pakistan in May 1998, which have dominated the US "approach, thinking, and activities in South Asia for the past 16 months." He also mentions the Kargil crisis and the necessity for India and Pakistan to resume a dialogue along the lines of the Lahore Summit. Inderfurth states that President Clinton "has pledged his 'personal interest' in seeing the bilateral efforts of the two countries accelerated and intensified in the search for resolving their long-standing and fundamental differences, including Kashmir." Inderfurth says that the failure of the United States to ratify the Comprehensive Test Ban Treaty (CTBT) could jeopardize its interests in South Asia and encourage the countries for further nuclear tests at some point in the future. This failure could also encourage other countries to acquire nuclear weapons, he says. Inderfurth emphasizes that the CTBT is "one means to prevent that." He talks about the importance of developing trade and investment, cooperation on science and technology, environment, health, stabilizing the population growth. He notes that there is a real opportunity for the United States to restructure its relations with the countries of South Asia and focusing only on the disagreements is unlikely to be conducive to promoting cooperation with the region.

— Karl F. Inderfurth, Assistant Secretary of State for South Asian Affairs, "Engaging South Asia," Remarks at Paul H. Nitze School of Advanced International Studies (SAIS), Washington, DC, 6 October 1999, US Department of State, www.state.gov.

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24 September 1999

The Unit 2 reactor of the Kaiga Atomic Power Project goes critical. The 220MWe reactor is later synchronized to the Southern grid on 2 December 1999.

—Government of India, *Department of Atomic Energy Annual Report:1999-2000*, p. 1.3, Executive Summary, www.vigyan.org.in.

22 September 1999

In the statement in the General Debate in the UN General Assembly, the Minister of External Affairs of India Jaswant Singh states that the objective of global nuclear disarmament "still beckons us." Singh says India "was obliged to acquire nuclear weapons because of the failure of the existing nonproliferation regimes to address [India's] primary security concerns." Despite this fact, Singh reiterates that India's "commitment to global nuclear disarmament stands undiluted," emphasizing that India is "the only nuclear weapon state" ready to negotiate a Nuclear Weapons Convention to eliminate nuclear weapons altogether. According to Singh, elimination of the nuclear weapons is "a step-by-step process." The first step, he says, is technical: "for all countries possessing nuclear weapons to undertake measures that will reduce the dangers of and provide added safeguards against any unintended or accidental use." The next step is political: re-orienting nuclear doctrines towards no-first-use, later leading to the non-use of these weapons thus delegitimizing them globally. Singh notes that with respect to the Comprehensive Test Ban Treaty (CTBT), India's position remains consistent and India is "ready to bring these discussions to a successful conclusion" provided that "a positive environment" is created and other countries agree to the treaty unconditionally. Singh mentions that India's "readiness" to discuss the Fissile Material Cut-Off Treaty (FMCT) even though the Conference on Disarmament is deadlocked on this issue.

—Statement by Shri Jaswant Singh, External Affairs Minister in the General Debate of UN General Assembly, 22 September 1999, Ministry of External Affairs, Government of India, www.meadev.nic.in.

August 1999

India opens negotiations with Dassault Aviation of France to explore the possibility of acquiring an additional 16 to 18 Mirage 2000-D fighter aircrafts at a price of \$11.62 million each. The deal includes an option to add another batch of this aircraft later. The deal is expected to be finalized by October 1999.

—Amir Mateen, "India Buying Mirage 2000 Nuclear Squadron," *Hindustan Times* (New Delhi), 30 August 1999, www.hindustantimes.com.

20 August 1999

Prime Minister Atal Bihari Vajpayee publicly states that the draft nuclear doctrine submitted by the National Security Advisory Board (NSAB) is "not a final paper" and it does not contain anything that the government did not say earlier. Vajpayee states that India is "prepared to discuss the draft and there has been no change in our policy of no-first-use and no use of nuclear weapons against non-nuclear states." Vajpayee reiterates India's call on nuclear weapon states to "come forward for destruction of their arsenals" indicating that "India would take a lead towards making this world a nuclear-free one."

—"N-Doctrine Mere Draft: Vajpayee," *Hindustan Times* (New Delhi), 21 August 1999, www.hindustantimes.com.

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19 August 1999

India's Foreign Minister Jaswant Singh publicly states he is ready to discuss the Indian draft nuclear doctrine with the United States. Singh refutes the possibility of a nuclear conflict with Pakistan. He says that restraint is "the hallmark of India's international conduct." Commenting on the draft nuclear doctrine released by the National Security Advisory Board (NSAB) on 17 August 1999, Singh says the document is not a "contentious issue." He emphasizes that the released document is a discussion document that lays out the broad parameters from which successor Indian governments could draw up a nuclear doctrine.

—"Jaswant Rejects US Concerns," *Hindu* (Chennai), 20 August 1999, www.hinduonline.com.

August 1999

The Bhabha Atomic Research Center (BARC) enters the final stage of assembling an electron accelerating machine Kali-5000. Work on this project was suspended in 1985 by R. Chidambaram, then Director of BARC. It resumed in 1989. The *Hindu* reports that in the present form the machine "weighs 26 tons, including tanks containing 12000 liters of fuel....The machine will shoot several thousand bursts of microwaves, each burst lasting for just 60 billionths of a second and packed with a power of about four gigawatts." According to BARC scientists, it can be used as a beam weapon by bursting microwaves that would cripple the electronic systems and computer chips of the enemy aircraft and missiles. The scientists say that Kali "for the first time provided India a way to 'harden' the electronic systems used in satellites and missiles against the deadly electromagnetic impulses generated by nuclear weapons." The Head of Accelerator and Pulse Power Division at BARC Mr. P.H. Ron says the machine is to be ready for testing by the end of this year. According to Ron, Kali was developed for industrial use and its "defense use was a recent spin off." The *Hindu* reports that the Defence Ballistics Research Institute in Chandigarh is already using an X-ray version of Kali to study the speed of projectiles. Another defense institute in Bangalore is using a microwave-producing version of Kali to test the vulnerability of the electronic systems and design electrostatic shields to protect them from the microwave attack by the enemy.

—"India's Beam Weapon in Final Stages," *Hindu* (Chennai), 19 August 1999, www.hinduonline.com.

18 August 1999

India's foreign affairs minister Jaswant Singh discusses the "Draft Report" submitted by the National Security Advisory Board (NSAB) in an interview with a private television channel. Singh says "there is no need for anyone to fear" what he calls "a discussion paper." He also notes that India's nuclear program is "neither country specific, nor strike specific" and it is "completely unwarranted" to read anything more in it. Singh says that as soon as the elections are over, the Government of India will "endeavor to create a larger political consensus" on this issue.

—"Jaswant Allays US Fears on Nuclear Policy; Opposition Assails Government," *Times of India* (Mumbai), 19 August 1999, <http://timesofindia.indiatimes.com>.

17 August 1999

India's National Security Advisor Brajesh Mishra releases the "Draft Report of India's Nuclear Doctrine." The report dwells on India's key nuclear policy objectives, proposed nuclear force architecture, issues of survivability, credibility, command and control of nuclear forces, safety and security, research and development, and position on arms control and disarmament issues.

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—"Draft Report of National Security Advisory Board (NSAB) on Indian Nuclear Doctrine," 17 August 1999, <http://meadev.nic.in>.

11 August 1999

In a warning to Pakistan, Minister of External Affairs Jaswant Singh says that the Indian government expects that "Pakistan would not be so unwise as to assume that India will not act in protecting its territorial integrity-land, sea, or air-simply because the Indian armed forces, under instructions from the government, acted with exemplary restraint during the Kargil confrontation." Indian government officials say the shadow of possible nuclear confrontation has led Pakistan to believe that "it could push the envelope of military tensions and India might remain inhibited in its response."

—C. Raja Mohan, "Jaswant Cautions Pakistan," *Hindu* (Chennai), 12 August 1999, www.hinduonline.com.

27 July 1999

Hindustan Times reports that "a highly classified nuclear submarine project has already started and was coming well." The report says that a budget of 300 million rupees has been allotted for the project. The government has yet to decide whether nuclear powered submarines will actually carry nuclear weapons.

—"India to Produce Indigenous N-Submarine," *Hindustan Times* (New Delhi), 24 June 1999, www.hindustantimes.com.

20 July 1999

In an interview with BBC, Defense Minister George Fernandes says that India does not intend to join the "bomb race" and considers nuclear weapons "only as a deterrent." He also says he was misquoted as having said that China is India's number one enemy. He asserts he had actually said it was "a potential number one enemy" and "there is a difference between enemy number one and potential enemy number one."

—"Fernandes Says India's Nukes are Only a Deterrent," Rediff On The Net, 21 June 1999, www.rediff.com.

1 July 1999

In response to Pakistan's threat to use nuclear weapons in the event of a larger conventional war, Prime Minister Vajpayee remarks that "we [India] are prepared for all eventualities."

—"India not daunted by Pak nuke threat: PM," *Times of India* (Mumbai), 1 July 1999, www.timesofindia.indiatimes.com.

24 June 1999

The Pakistani daily *The News* reports that Pakistan will continue to support the infiltrators in Drass and Kargil and may not hesitate to use its "ultimate option" in the case of an attack from India. Pakistani Prime Minister Nawaz Sharif warns of "irreparable losses" if the situation along the Line of Control escalated into a wider war.

—Vijay Datt, "Pakistan Does Not Rule Out Use of N-Arms: Report," *Hindustan Times* (New Delhi), 24 June 1999, www.hindustantimes.com; Kamal Siddiqi and Agencies, "Pak peeved, say US not 'fair & balanced'," *Indian Express* (Mumbai), 25 June 1999, www.expressindia.com.

21 June 1999

Principal Secretary to the Prime Minister and National Security Adviser Brajesh Mishra says India will "stick to 'no-

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first-use' of nuclear weapons but would go all out if any attempt is made against it."

—"India Firm on 'No First Use' of Nuke Weapons," Rediff On The Net, 21 June 1999, www.rediff.com.

20 June 1999

India's Home Minister L.K. Advani says India wants to treat the conflict with Pakistan in Kargil as "a limited war" and make sure that it does not escalate.

—"India for Treating Kargil as Limited War: Advani," *Hindustan Times* (New Delhi), 20 June 1999, www.hindustantimes.com.

8 June 1999

The US Senate approves Amendment No. 602 suggested by senators Sam Brownback and Pat Roberts on "Suspension of Certain Sanctions against India and Pakistan" (known as the Brownback Amendment). The amendment suspends the sanctions imposed under Section 101 of the Arm Export Control Act, Section 102 of the Arms Export Control Act (except for subsection (b)(2)(B), (C) or (G) dealing with the exports of military and dual-use items), and Section 2(b)(4) of the Export Import Bank Act for the period of five years. The amendment calls for a revision of the list of 300 Indian and Pakistani entities prohibited from importing goods from the United States. The revised list is to be submitted to the Senate by the president within 60 days of enactment of the Amendment. The suspension of the above mentioned sanctions can be renewed by the president for the additional period of five years provided that the President within 30 days prior to each renewal certifies that it is in the national interest of the United States.

—Brownback Amendment No. 602, Senate, 8 June 1999, Thomas Legislative Information on the Internet, <http://thomas.loc.gov>.

31 May 1999

In view of the expanded military operations along the Line of Control in the Kargil sector, Pakistan's foreign secretary Shamshad Ahmed warns India that "we [Pakistan] will not hesitate to use any weapon in our arsenal to defend our territorial integrity."

—"Pak won't hesitate to use 'any weapon'," Rediff On The Net, 31 May 1999, www.rediff.com.

16 May 1999

In an interview with the *Times of India*, the Chief of Air Staff Marshall Ashok Yashwant Tipnis says that the Indian Air Force (IAF) is "seeking to build up both offensive and defensive capabilities to counter 'extra-regional influences'." He says he would like the IAF to take possession of the Agni intermediate-range ballistic missile (IRBM). According to Tipnis, India will be getting more Sukhoi-30 and Mirage-2000 fighters. Tipnis says the role of IAF as a strategic force has increased since India has carried out nuclear tests on 11 and 13 May 1998 and it is watching closely the "military capabilities being acquired both in our neighborhood and outside."

—Dinesh Kumar, "Let's Be Stronger and Smarter, Says IAF Chief," *Times of India* (Mumbai), 16 May 1999, <http://timesofindia.indiatimes.com>.

11-17 May 1999

The Indian Army acquires additional information that Pakistani intrusions have occurred along the Line of Control

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in the Kargil, Batalik, Dras, and Mashkoh sectors. In response, the Army's Northern Commands begins preparations to recapture occupied Indian territory.

—"Kargil Intrusion Reconstructed," *From Surprise to Reckoning: The Kargil Review Committee Report* (New Delhi: 2000, Sage Publications India Pvt. Limited), p. 100.

11 May 1999

Caretaker Prime Minister Atal Bihari Vajpayee publicly states that India will "conduct further nuclear or missile tests if needed" for the country's "self-defense so that no country will dare attack India in the future." Vajpayee also says that India would sign the Comprehensive Test Ban Treaty (CTBT) "provided that the pact fulfilled India's aspirations on time-bound global disarmament."

—"India to Conduct More Nuclear Tests if Needed: Vajpayee," *Dawn* (Karachi), 12 May 1999, www.dawn.com

8 May 1999

In an interview, India's Minister of External Affairs Jaswant Singh says there is now "better...understanding of India's position [on nuclear issues] and a much greater appreciation of India as a factor in the international community." According to Singh, "India now has acquired for itself greater and more enhanced strategic space and, without a doubt, greater consequential strategic autonomy." Singh reiterates that India "has not forsaken" its commitment to nuclear disarmament due to the tests of 11 and 13 May 1998. It remains committed to the principle of "equal and legitimate security for all" that is achievable "only through the path of global disarmament." Referring to the ongoing Indo-US talks, Singh calls them "the longest lasting, the most productive and potentially, the most useful talks the United States and India have had in the past many decades." He points out that despite the greater harmonization of the viewpoints, the two sides have not yet reached "the end of the road." Thus, he says, the talks must continue. With respect to the Comprehensive Test Ban Treaty (CTBT), Singh says that until the elections are over, the government cannot proceed with this issue. Singh also asserts that India is a nuclear weapon power. "This is a fact and facts cannot be disinvented," he says. This status "confers upon India a much greater responsibility and India is mindful" of this. Singh asserts that India is "not set out on the path of disturbing the Non-Proliferation Treaty nor has it deviated from the goal of complete global disarmament."

—Amberish K. Diwanji, "India in Neither in the First, Second or Third World, India Is a World in Its Own Right," *Rediff On The Net*, 11 May 1999, www.rediff.com; "India is Not Marginalized, India Cannot Be Marginalized," *Rediff on The Net*, 11 May 1999, www.rediff.com.

6 May 1999

The *Times of India* reports that Indian scientists "have identified possible sites for constructing the first deep geological repository where radioactive waste can be stored for over a million years." The names of the sites are not yet disclosed. However, it is known that the sites will be constructed in granite rocks due to their "structural stability, location in low seismicity zones, favorable hydrological conditions," as well as "low mining value, accessibility, and distance from populated areas." The Bhabha Atomic Research Center (BARC) is responsible for managing nuclear waste from power plants and fuel reprocessing facilities. It has carried out research and development activities for the construction of geological repositories at an abandoned gold mine at Kolar, Karnataka. The newspaper reports that modeling and simulation studies have been carried out "to see how the rocks will interact with the waste." BARC is also developing processes "to extract useful materials from waste so

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that the amount of radioactivity in waste could be reduced." BARC has submitted a proposal to the Atomic Energy Regulatory Board (AERB) to construct a pilot geological repository that could cost around three billion rupees. It has been estimated that the construction of a deep repository could take up to ten to twelve years.

—Dinesh C. Sharma, "Burial Sites for N-Waste Identified," *Times of India* (Mumbai), 1 May 1999, <http://timesofindia.indiatimes.com>.

3 May 1999

India discovers Pakistani intrusions along the Kargil sector along the Line of Control in Indian-administered Kashmir.

—"Kargil Intrusion Reconstructed," *From Surprise to Reckoning: The Kargil Review Committee Report*, (New Delhi: 2000, Sage Publications India Pvt. Limited), p. 98.

3 May 1999

India's Ministry of External Affairs (MEA) terms the allegations that India was stealing US nuclear weapons secrets as "malicious and completely baseless." According to an MEA spokesperson, India's nuclear program "is an excellent example of indigenization" and the US news report attempted to "tarnish [India's] remarkable achievement."

—"India Terms Spying Charge Malicious," *Times of India* (Mumbai), 1 May 1999, <http://timesofindia.indiatimes.com>.

1 May 1999

The *New York Times* reports that a classified US intelligence report says that China poses an "acute intelligence threat" to US nuclear laboratories. This 25-page report was prepared by counterintelligence experts in November 1998. India appears in the list of countries "spying" on US nuclear secrets. According to the report, "an unknown individual sent 38 faxes to India from inside a sensitive area of the Oak Ridge Laboratory in Tennessee, during a 30-day period in 1995 and 1996."

—Jeff Gerth, James Risen, "1998 Report Told of Lab Breaches and China Threat," *New York Times*, 2 May 1999; in Lexis-Nexis Academic Universe, 2 May 1999, www.lexis-nexis.com.

April 1999

Speaking to a group of Indian journalists, a senior official of the French Ministry of Foreign Affairs says France is quite confident that the Bharatiya Janata Party (BJP) government will sign the Comprehensive Test Ban Treaty (CTBT) before the September 1999 deadline. He says it is "not fair to cut India from nuclear cooperation and energy. India's goal of raising nuclear energy from the present two percent of its total energy production to eight-ten percent seems reasonable." According to the spokesperson, France has "always taken the stand that India should be given some time to prove its bona fides as far as conformity to the nonproliferation regime is concerned." He says it is important that India signs the CTBT and Fissile Material Cut-Off Treaty (FMCT) for France to be able "to help India in nuclear energy development."

—"Government Has Committed Itself to Signing CTBT," *Hindustan Times* (New Delhi), 6 May 1999, www.hindustantimes.com.

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April 1999

In interviews to *India Today* and *Outlook*, Prime Minister of India Atal Bihari Vajpayee says India cannot commit itself to sign the Comprehensive Test Ban Treaty (CTBT) by the September 1999 deadline since the dissolution of parliament has made it impossible to reach a consensus on the issue. He says, however, that his government would try to call an all-party meeting to come to an agreement on this issue. Vajpayee says he does "not have much hope since we are in the midst of [a] do-or-die election."

—"CTBT Signing by September Unlikely: PM," *Times of India* (Mumbai), 1 May 1999, <http://timesofindia.indiatimes.com>.

28 April 1999

Pakistani foreign office spokesperson Tariq Altaf tells *Dawn* that secretary-level talks with India will take place despite the dissolution of Lok Sabha (India's lower house of parliament) in India. According to Altaf, "the tentative time period agreed for the talks was June-July 1999, [but] since the talks are to take place in India, they have to intimate us about the exact dates." Altaf says that Pakistan "had asked India for a strategic restraint regime" and "will continue pressing for the same."

—Ansar Abbasi, "Talks with India Likely to Go Ahead," *Dawn* (Karachi), 29 April 1999, www.dawn.com.

28 April 1999

Defense Minister George Fernandes addresses a plenary session of the National Conference of the Confederation of Indian Industry (CII). He says India is unable to sign either the Comprehensive Test Ban Treaty (CTBT) or the NPT until its security concerns are properly addressed. Fernandes states that following the Pokhran II tests and the launch of Agni II, India has been converted from "a soft state" into a "strong" one.

—"Security Must Be Assessed, Says Fernandes," *Hindu* (Chennai), 29 April 1999, www.hinduonline.com.

27 April 1999

India resumes its dialogue with China. The Indo-Chinese Joint Working Group meets in Beijing for the first time since August 1997. India's Foreign Secretary K. Raghunath is quoted by the Press Trust of India as saying, "we will forcefully raise with China all our concerns, including the Beijing-Islamabad nexus against India and China's attempt to isolate India amongst the developed nations on the nuclear issue."

—Seema Guha, "India to Raise Security Concerns with China," *Times of India* (Mumbai), 27 April 1999, <http://timesofindia.indiatimes.com>.

26 April 1999

President Narayanan dissolves India's lower house of parliament (Lok Sabha) and orders fresh elections. The National Democratic Alliance (NDA) government led by Prime Minister Vajpayee continues to rule in a caretaker capacity.

—K.K. Katyal, "Lok Sabha dissolved, elections ordered," *The Hindu* (Chennai), 27 April 1999, www.hinduonline.com.

21 April 1999

The Swedish National Radio, citing unidentified sources, states that a diplomat at the Indian embassy "sought to have a Swedish operator get details about Swedish defence material exports to Pakistan" and expressed interest in

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"Swedish technology that could be used in making nuclear weapons." Swedish Ministry for Foreign Affairs spokesperson Jens Odlander refuses to comment on the allegations.

—"India Tried to Get Nuclear Information from Stockholm," *Times of India* (Mumbai), 23 April 1999, <http://timesofindia.indiatimes.com>.

April 1999

The United States postpones the expert-level meeting with India on fissile material cut-off scheduled in April. The Indo-US dialogue is to resume once a new government assumes office in New Delhi.

—K.K. Katyal, "Dialogue Process Put on Hold," *Hindu* (Chennai), 28 April 1999, www.hinduonline.com.

17 April 1999

The Bharatiya Janata Party (BJP)-led National Democratic Alliance loses a vote-of-confidence in parliament by one vote. Prime Minister Vajpayee resigns. However, President Narayanan asks him to "continue in office till alternative arrangements are made."

—Harish Khare, "BJP-led govt. quits after losing by one vote," *The Hindu* (Chennai), 18 April 1999, www.hinduonline.com.

8 April 1999

Seven workers who helped plug a heavy water leak in the second unit of Madras Atomic Power Station (MAPS) on 26 March 1999 are placed in the "removal category." These workers will not be allowed into radioactive areas due to the heavy dosage of radiation they received during the operation. An estimated 40 to 50 workers were present at MAPS at the time of the incident. Most of them will be placed in the "caution category," that is "they could come to the plant but should not receive the 'normal' dose of radiation," a representative of the MAPS workers says. Neither MAPS, the Nuclear Power Corporation (NPC), nor the Atomic Energy Regulatory Board (AERB) disclose the precise reason for the leak or release information on the amount of heavy water that leaked into the reactor vault. The AERB does note, however, that the pressure tubes in the pressurized heavy water reactor units one and two "were made of inferior quality zircalloy which was prone to hydrogen pick up and damage." The *Hindu* reports that in June 1996, the AERB knew that several tubes had "elongated, sagged, and made contact with the calandria tubes." Citing an expert, the *Hindu* reports that "leaving them [the tubes] in that state and continuing to operate was highly unsafe" and could potentially expose the population of the Kalpakkam neighborhood to radiation. David Kyd, Public Information Director at the International Atomic Energy Agency (IAEA) says, "the Indian authorities have not seen it fit so far to request our help on safety matters and hence we have never been able to send a safety-related team to any Indian nuclear power plant."

—R.K. Radhakrishnan, "MAPS Tightlipped over Heavy Water Leak," *Hindu* (Chennai), 3 April 1999, www.hinduonline.com.

April 1999

The Annual Report of the Ministry of External Affairs says that Indo-US talks are being conducted "on the basis of comprehensive proposals that India has put forward on disarmament and nonproliferation matters." According to the report, the dialogue has created some progress "in creating better understanding of India's security concerns by the US authorities." The report reiterates that India's concerns over the adverse affect of China's cooperation

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with Pakistan, specifically in its nuclear and missile development program, have been communicated to the Chinese government. The report states that the nuclear tests carried out in May 1998 were not country-specific and India's "nuclear weapons and missile development programs are based on the principles of minimum sufficiency and deterrent capability. Like China, India has declared a no first use doctrine."

—Annual Report 1999-2000, Ministry of External Affairs, Government of India, www.meadev.nic.in; "Progress in Jaswant, Talbott Talks," *Times of India* (Mumbai), 7 April 1999, <http://timesofindia.indiatimes.com>.

2 April 1999

India's National Security Adviser and Principal Secretary to Prime Minister Brajesh Mishra tells reporters that India's National Security Advisory Board will submit a draft of India's nuclear doctrine later in April.

—"Jaswant May Visit Beijing, Says Brajesh Mishra," *Hindu* (Chennai), 3 April 1999, www.hinduonline.com.

29-30 March 1999

India and the United States hold talks on export controls in New Delhi in continuation of the talks held on 9-10 November 1998. According to India's Ministry of External Affairs, "the talks were useful and positive and held the prospect of continued cooperation in this area." However, no progress is reported. During the talks, US officials decline to address the question of the list of Indian entities banned from trading with the United States.

—"Export Control Talks Inconclusive," *Hindustan Times* (New Delhi), 31 March 1999, www.hindustantimes.com.

26 March 1999

Heavy water leakage occurs in the second unit of the Madras Atomic Power Station (MAPS). However, Department of Atomic Energy (DAE) do not disclose the precise nature of the leak nor how much heavy water leaked into the reactor vault.

—R.K. Radhakrishnan, "MAPS Tightlipped over Heavy Water Leak," *Hindu* (Chennai), 3 April 1999, www.hinduonline.com.

22 March 1999

Pakistan's Foreign Minister Sartaj Aziz says security experts from India and Pakistan will meet next month "to agree on security concepts and nuclear doctrines." According to Aziz, Pakistan "is pursuing in good faith various confidence-building measures. But the progress will be difficult to sustain or even justify if there is no progress on the substantive issue of Kashmir."

—"India, Pakistan to Discuss Kashmir in May," Rediff On The Net, 23 March 1999, www.rediff.com.

19 March 1999

Indian and Pakistani foreign ministers Jaswant Singh and Sartaj Aziz meet on the sidelines of the 21st session of the South Asia Association for Regional Cooperation (SAARC) Council of Ministers at Nuvara Eliya, Sri Lanka. Both ministers agree to hold a meeting of experts for the implementation of the Memorandum of Understanding (signed on 21 February 1999) in the next two months; to start a new round of dialogue in May 1999 in New Delhi and Islamabad; and to meet shortly upon completion of the proposed May-June dialogue process.

—"India-Pakistan Joint Statement Issued at Nuvara Eliya, Sri Lanka," 19 March 1999, Embassy of India, Washington, DC, www.indianembassy.org.

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17 March 1999

In a speech before India's parliament, Defense Minister George Fernandes says the Indian Army "has devised a three-tier system of training medical officers and paramedical staff to handle casualties of nuclear, biological, and chemical weapons. The Army officers would form the first tier, junior commissioned officers the second and battle field nursing assistants the third." He says that India has "to do much more keeping in view the impending danger of nuclear and biological weapons." He says India is prepared to meet any eventuality, including the use of chemical and biological weapons.

—"Sukhoi manufacture: final decision yet to be taken," *Hindu* (Chennai), 18 March 1999, www.hinduonline.com.

6 March 1999

India's Chief of Army Staff General Ved Prakash Malik says, "Nuclear deterrence does reduce the possibility of war, but it does not make war redundant." Hence, India should keep a strong military force and continue with its military modernization program. Malik says, "there would be no compromise on training the personnel despite the escalation in costs."

—"Nuclear Deterrence Doesn't Make War Redundant," Rediff On The Net, 6 March 1999, www.rediff.com.

February-March 1999

In an article in *Foreign Affairs*, the US Deputy Secretary of State Strobe Talbott writes that the United States "must remain committed to the long-range goal of universal adherence to the NPT. It cannot concede, even by implication that India and Pakistan have by their tests established themselves as nuclear weapon states with all the rights and privileges enjoyed by the parties to the NPT, such as full international help in developing nuclear energy for peaceful purposes. To relent would break faith with those states that have forsworn the capability they could have acquired." Talbott states that "until India and Pakistan disavow nuclear weapons and accept safeguards on all their nuclear activities, they will continue to forfeit the full recognition and benefits that accrue to members in good standing of the NPT." Talbott indicates that "lifting sanctions would be only one component of a return to the process of transforming the relationships, which was among the first casualties of the May tests." He points out that the United States "does not expect either [India or Pakistan] to alter or constrain its defense programs simply because we have asked it to. The essence of the case the administration is making to both is that they can meet their security requirements as we have heard them define them without further testing nuclear weapons, without producing more fissile material, and without deploying nuclear capable missiles." Talbott mentions "five practical steps" for both countries to concentrate on. The steps include: the Comprehensive Test Ban Treaty (CTBT); the Fissile Material Cut-Off Treaty (FMCT); strategic restraint; export controls; and India-Pakistan dialogue.

—Strobe Talbott, "Dealing with the Bomb in South Asia," *Foreign Affairs*, Volume 78, No. 2, March-April 1999, pp. 110-122.

February-March 1999

Indian government officials say the implementation of the Memorandum of Understanding (MoU) signed by the foreign secretaries of India and Pakistan on 21 February 1999 requires "considerable work before it yields working arrangements." Indian officials say the document can be operationalized only if "political direction remains constant" pointing at agreements on Siachen and Tulbul projects that were never implemented.

—Manoj Joshi, "Peace Pledge," *India Today*, 8 March 1999, www.india-today.com.

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26 February 1999

In Suo Motu statement before parliament, India's Foreign Minister Jaswant Singh talks about Prime Minister Vajpayee's visit to Pakistan on 20-21 February. Singh describes it "the most significant engagement between India and Pakistan in over a quarter of a century." Singh indicates that the visit "provided the prime minister with an opportunity to emphasize that India and Pakistan must together work to build a comprehensive structure of cooperation, resolve outstanding issues through peaceful and direct bilateral discussions and negotiations and that the path of violence was futile and senseless." Singh calls the Lahore declaration signed by the two sides on 21 February "a landmark for peace and security of the two nations."

—Suo Motu Statement of the Minister of External Affairs in Parliament on Prime Minister's Visit to Pakistan, 26 February 1999, Ministry of External Affairs, the Government of India, www.meadev.nic.in.

26 February 1999

India's Minister for External Affairs Jaswant Singh refutes US Secretary of State Madeline Albright's statement that India has agreed to adhere to the Comprehensive Test Ban Treaty (CTBT). In a speech before parliament, Singh says the Indian government's position on not signing the CTBT is "explicit, clear and unambiguous" and he cannot be held responsible for Ms. Albright's remarks.

—"Albright's Remarks Do not Reflect India's Stand: Jaswant," *Hindu* (Chennai), 27 February 1999, www.hinduonline.com.

24 February 1999

US Secretary of State Madeleine K. Albright testifies before the Senate Foreign Relations Committee on the Fiscal Year Budget 2000. Albright says, "If the past year was a time of disappointment and unfulfilled promise in South Asia, we are working hard to see that the coming year is one of opportunity and progress." Speaking on progress in South Asia, she says that both India and Pakistan have "agreed to adhere to the Comprehensive Test Ban Treaty (CTBT) by year's end, join negotiations for a fissile materials production cutoff and tighten export controls." Noting the "successful summit in Lahore," Albright says that India and Pakistan "have taken encouraging steps" to improve bilateral relations with each other. With respect to future US policy in South Asia she says that "throughout the region, we will be working hard to advance our core foreign policy objectives of strengthening democracy, enhancing economic ties, countering terrorism, extending the rule of law and promoting respect for human rights."

—"Fiscal Year 2000 Budget," Secretary of State Madeleine Albright, Testimony before the Senate Foreign Relations Committee, 24 February 1999, US Department of State, www.state.gov.

24 February 1999

In an address to parliament, India's Minister of External Affairs Jaswant Singh declares that India is a nuclear weapon state despite the fact that this is not acknowledged by the United States. Singh states that in determining the concept of minimum nuclear deterrence India will rely on its own security requirements "which are changing." According to Singh, India has "not agreed to sign the Comprehensive Test Ban Treaty (CTBT) by September this year" and "there is no iota of truth in press reports" on the issue.

—"India is a Nuclear Power, Asserts Jaswant," Rediff On The Net, 24 February 1999, www.rediff.com.

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21 February 1999

Indian and Pakistani foreign secretaries (K. Raghunath and Shamshad Ahmed) sign a Memorandum of Understanding in which they agree to "engage in bilateral consultations on security concepts and nuclear doctrines, with a view of developing measures for confidence building in the nuclear and conventional fields, aimed at avoidance of conflict; to provide each other with advance notification in respect of ballistic missile flight-tests, and to conclude a bilateral agreement in this regard; to undertake national measures to reduce the risks of accidental and unauthorized use of nuclear weapons under their respective control; to notify each other immediately in the event of any accidental, unauthorized, or unexplained incident that could create the risk of a fallout with adverse consequences for both sides, or an outbreak of a nuclear war between the two countries; to adopt measures aimed at diminishing the possibility of such actions or such incidents being misinterpreted by the other; to identify/establish appropriate mechanism for this purpose; to continue to abide by their respective unilateral moratorium on conducting further nuclear test explosions unless either side, in exercise of national sovereignty, decides that extraordinary events have jeopardized its supreme interests." The two sides also agree "to review periodically the implementation of existing confidence building measures [CBMs] and where necessary set up appropriate consultative mechanisms to monitor and ensure effective implementation of these CBMs; to review the existing communication links (e.g., between the respective Directors-Generals, Military Operations) with a view of upgrading and improving these links, and to provide for fail-safe and secure communications; engage in bilateral consultations on security, disarmament and nonproliferation issues within the context of negotiations on these issues in multilateral fora."

—*Memorandum of Understanding*, 21 February 1999, Ministry of External Affairs, the Government of India, www.meadev.nic.in.

21 February 1999

Prime Minister Atal Bihari Vajpayee and a 16-member delegation visits Pakistan inaugurating the bus service between New Delhi and Lahore. In Pakistan, Vajpayee and Pakistani Prime Minister sign the Lahore Declaration in the historic city of Lahore. Under the terms of the declaration, the two sides agree to "intensify their efforts to resolve all issues, including the issue of Jammu and Kashmir; to refrain from intervention and interference in each other's internal affairs; to intensify their composite and integrated dialogue process for an early and positive outcome of the agreed bilateral agenda; to take immediate steps for reducing the risk of accidental or unauthorized use of nuclear weapons and discuss concepts and doctrines with a view to elaborating measures for confidence building in the nuclear and conventional fields, aimed at prevention of conflict." The Joint Statement issued at the end of Vajpayee's visit to Pakistan says that the two sides agree to "meet periodically to discuss all issues of mutual concern, including nuclear related issues."

—*The Lahore Declaration*, 21 February 1999, Joint Statement, 21 February 1999, Ministry of External Affairs, Government of India, www.meadev.nic.in.

20 February 1999

The chairman of the India's Atomic Energy Regulatory Board (AERB) lays the foundation stone for the Safety Research Institute (SRI) at Kalpakkam, near Chennai. The SRI "is conceived as a forum to bring together plant designers, operators, research groups and regulators to formulate and manage research programs for resolving

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safety-related issues in nuclear establishments." According to the AERB chairman Professor Rama Rao, the SRI will carry out a substantial amount of research internationally. Besides carrying out the atmospheric studies, the institute will set up a "safety-related code depository" and develop "safety-critical software in the area of plant safety." Rao says the institute "would serve as an instrument to review, authorize and enforce standards, from the safety angle, during various phases of development, maintenance, and operation of nuclear facilities." Among other planned activities for SRI, Rao mentions training and discussion meetings by experts and visiting scholars, development of the models for assessing fire hazards in nuclear fuel cycle facilities, risk assessment for operations involving hazardous materials such as beryllium. During the ceremony, Atomic Energy Commission (AEC) chairman R. Chidambaram says the SRI should coordinate the activities of the Bhabha Atomic Research Center (BARC), Nuclear Power Corporation (NPC), and the Indira Gandhi Center for Atomic Research (IGCAR) in the field of probabilistic safety assessment.

—"N-Safety Research Facility Near Chennai," *Hindu* (Chennai), 21 February 1999, www.hinduonline.com.

February 1999

In an interview with *India Today*, US Deputy Secretary of State Strobe Talbott says that during negotiations, both India and the United States are trying "to preserve the integrity of each government's deeply held positions and long-range strategy while at the same time advance the cause which is also important for both governments. And that is finally getting the US-India relations right." Talbott says the four benchmarks of the negotiations (signing the Comprehensive Test Ban Treaty (CTBT), controlling fissile material production, export controls, and reduction of tensions with Pakistan) are "eminently feasible" targets. He says the United States is not going to dictate what India's defense posture should be; however, he points the need to reconcile "two adjectives, credible and minimum" in India's deterrent concept.

—Raj Chengappa, "We are Keen to Put Sanctions Behind Us: Interview with Strobe Talbott," *India Today*, 15 February 1999, www.india-today.com.

February 1999

The Indian Army's Signals Officer-in-Chief Lieutenant General Prakash Gokarn tells *Asia Defence News International* that the Indian Army Corps of Signals is preparing to deal with electromagnetic pulses generated during a nuclear explosion. He says: "The Corps of Signals is aware of the lurking danger to our automated information systems in the nuclear age and is busy creating firewalls against any attempt to go for the nation's 'electronic jugular'."

—"Corps of Signals Gears up to Face a Nuclear Threat," Rediff On The Net, 15 February 1999, www.rediff.com.

11 February 1999

An Indian foreign ministry official says that creation of a "positive and conducive international environment," is essential for India to proceed with the Comprehensive Test Ban Treaty (CTBT).

—"Positive Environment Needed for Signing CTBT: India," *Hindustan Times* (New Delhi), 12 February 1999, www.hindustantimes.com.

11 February 1999

The G-8 task force chairman Nobuyasu Abe says India and Pakistan should comply "with all the demands of the UN Security Council" before sanctions can be lifted. The task force also asks India and Pakistan to reduce bilateral

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tensions.

—"G-8 Officials Support Curbs on India, Pakistan," *Hindustan Times* (New Delhi), 12 February 1999, www.hindustantimes.com.

10 February 1999

India's Defense Minister George Fernandes publicly states that India will not proceed with the signing of the Comprehensive Test Ban Treaty (CTBT) unless there is a unanimous approval of both Houses of Parliament and India's security needs are taken care of.

—"Signing of CTBT only after Consensus," *Hindu* (Chennai), 11 February 1999, www.hinduonline.com.

6 February 1999

White House spokesperson Joe Lockart says US President Bill Clinton is not ready to lift sanctions against India and Pakistan.

—Sridhar Krishnaswami, "US not to Lift Sanctions," *Hindu* (Chennai), 7 February 1999, www.hinduonline.com.

4 February 1999

The United States begins easing some of the sanctions imposed by indicating that the US representative at the World Bank will not block a \$125 million loan for a power project in the Indian state of Andhra Pradesh. The United States also invites the Indian Chief of the Army Staff General V.P. Malik to attend a ceremony of the change of guards at the Pacific Command in Hawaii.

—K.K. Katyal, "US Shows Signs of Easing Sanctions," *Hindu* (Chennai), 5 February 1999, www.hinduonline.com; "US Lifts Opposition to India Loans," *New York Times*, 17 February 1999, www.nytimes.com.

4 February 1999

Atomic Energy Commission (AEC) Chairman Dr. R. Chidambaram addresses the Association of Indian Science Writers. He asserts that a "post-shot" analysis of the Pokhran II tests had confirmed that the May 1998 tests yielded about 60 kilotons as had been initially estimated by the AEC. Chidambaram says the scientists at the Bhabha Atomic Research Center (BARC) had used four methods to calculate the yields. These methods included the measurement of various types of shock waves and comparison of "some of the data from other seismic centers all over the world." Chidambaram points out that India had tested a "fusion-fission-fusion" device on 11 May 1998. He says a boosted fission device was a part of this design and there was no need to test it separately. According to Chidambaram, India was working on powerful lasers for "inertial confinement to produce fusion energy and uranium enrichment." He says India has developed the lasers although it does "not have the full energy yet." Chidambaram notes that Pokhran tests were "perfect" since Indian scientists had mastered "optimum emplacement of the device to ensure that over-digging or radioactive spillover was avoided."

—"Further Nuclear Tests Unnecessary," *Hindu* (Chennai), 4 February 1999, www.hinduonline.com.

3 February 1999

Speaking to reporters at Lucknow, Prime Minister Vajpayee says India wants the United States to lift the sanctions imposed in the aftermath of the May 1998 tests and reduce the list of Indian entities banned from trade with the United States. He says that "some progress" was made during the eighth round of Indo-US talks but "much ground

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is yet to be covered." Vajpayee emphasizes that India will not block the entry into force of the Comprehensive Test Ban Treaty (CTBT).

—"More Steps Needed for Signing CTBT: Vajpayee," *Hindu* (Chennai), 4 February 1999, www.hinduonline.com.

3 February 1999

A senior Chinese diplomat says China is not going to change its position on the nuclear issue in South Asia and will insist that India sign the Comprehensive Test Ban Treaty (CTBT) unconditionally. The *Hindu* reports that the Chinese government is "concerned" with the US moves to recognize India's demands for a minimum nuclear deterrent. Sha Zukang, China's Director-General of the Department of Arms Control under the Chinese Ministry of Foreign Affairs says, "it is a direct violation of the UN Security Council resolution 1172 to negotiate, or even to discuss with India, the so-called minimum deterrence capability."

—"China Concerned over US Move on Indian N-Tests," *Hindu* (Chennai), 4 February 1999, www.hinduonline.com.

3 February 1999

US Ambassador to India Richard F. Celeste publicly says that the United States could lift sanctions sooner than anticipated.

—"India Ready to Sign CTBT, Albright Told," *Hindustan Times* (New Delhi), 3 February 1999, www.hindustantimes.com.

2 February 1999

US Deputy Secretary of State Strobe Talbott informs the US Secretary of State Madeleine Albright that India has agreed to sign the Comprehensive Test Ban Treaty (CTBT) by the date of its entry into force date in September 1999 in return for lifting some of the sanctions on the loans from multilateral institutions. State Department spokesperson James Rubin says at a press briefing that "progress has been made in these most recent negotiations and we are consulting with Congress and other members of international community on how to respond to the movement in the right direction, in terms of the Comprehensive Test Ban." According to Rubin, "the movement in the right direction" had to do with the timing of the CTBT signing. He mentions that the United States has "received some encouraging indications on the timing" and is "considering how to respond" to that.

—"India Ready to Sign CTBT, Albright Told," *Hindustan Times* (New Delhi), 3 February 1999, www.hindustantimes.com; Sridhar Krishnaswami, "Movement in the Right Direction on CTBT," *Hindu* (Chennai), 3 February 1999, www.hinduonline.com.

1 February 1999

Indian Prime Minister Atal Bihari Vajpayee expresses satisfaction at the progress in the Indo-US dialogue and commends the concluding part of Indo-US Joint Statement issued on 31 January 1999 on the importance of "laying the foundation for a new, broad-based relationship that has eluded the United States and India in the past."

—K.K. Katyal, "PM Satisfied with Talks Progress," *Hindu* (Chennai), 2 February 1999, www.hinduonline.com.

1 February 1999

The United States invites the ambassadors of the G-8 countries in New Delhi to discuss the issue of resuming World Bank loans to India for road, power, and other development projects. According to the World Bank

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estimates, economic sanctions imposed in the wake of the May 1998 nuclear tests have cost India \$1.2 billion. However, the *Hindustan Times*, citing an official spokesperson from India's foreign ministry, reports there is no linkage between India's stand on the Comprehensive Test Ban Treaty (CTBT) and any easing of lending by multilateral institutions. The official says the easing of sanctions on loans from the World Bank and the International Monetary Fund will be only a "small step towards [the creation of a] positive environment" India needs before proceeding to sign the treaty. At the same time, the official reiterates that India will not block the treaty's entry into force.

—Celia W. Dugger, "US-India Talks Gain and Could Lead to Easing of Sanctions," *New York Times*, 1 February 1999, www.nytimes.com; "India Contradicts US View on Easing of Sanctions," *Hindustan Times* (New Delhi), 1 February 1999, www.hindustantimes.com.

1 February 1999

The *New York Times*, citing US and Indian officials, reports that India has made a "conditional offer" to sign the Comprehensive Test Ban Treaty (CTBT) provided economic sanctions imposed in the wake of its nuclear tests are lifted.

—"India, Pakistan Move on Nuke Issue," *New York Times*, 1 February 1999, www.nytimes.com.

31 January 1999

The eighth round of Strobe Talbott-Jaswant Singh talks held between 29-31 January, concludes. The talks consisted of four plenary meetings, expert level discussions, and several meetings between the heads of the two delegations, Jaswant Singh and Strobe Talbott.

The text of the Indo-US Joint Statement issued at the end of talks states that "both delegations are satisfied with the outcome of the talks...and a work plan for the next steps in the US-Indian dialogue was agreed." Further, "the US and Indian delegations at the Conference on Disarmament in Geneva will endeavor to consult frequently on the status of negotiations on a Fissile Material Cut-Off Treaty and possibly other multilateral initiatives." India and the United States also agree to have a ninth round of talks in the middle of the year. In addition, a follow-up meeting on export controls is scheduled for March 1999. Finally, the joint statement states that both countries are "laying the foundation for a new, broad-based relationship that has eluded the United States and India in the past which both sides are determined to achieve in the future."

—India-US Joint Statement, Press Release, 31 January 1999, Embassy of India in Washington, DC, www.indianembassy.org.

30 January 1999

US Deputy Secretary of State Strobe Talbott delivers an address at the India International Center in New Delhi. Commenting on the Indo-US dialogue Talbott says: "As a part and parcel of fully respecting the sovereignty of your nation, we take it as predicate of our diplomatic dialogue that the only workable solution to the nuclear issue is one that Indian leaders and the Indian public clearly see as in the best long-term interests of India itself." He says that the word "concession" is not a part of vocabulary of the American team. According to Talbott, the Indo-US dialogue is "not about winning or losing; it's aimed at a win-win outcome. Which is to say our talks are about laying the foundation for a future in which the US and India are able to maximize common goals-and that means one in which we are also able to minimize and manage our differences." Talbott says the goal of the talks is to "harmonize

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India's interests, convictions, and perceptions with those of the US..." He says this is a difficult task but he is hopeful that the solution is forthcoming.

—Strobe Talbott, Address at India International Center, 30 January 1999, New Delhi, US Department of State, www.state.gov.

29 January 1999

US President Bill Clinton telephones India's Prime Minister Atal Bihari Vajpayee. Clinton expresses his appreciation of India's undertaking to adhere to the Comprehensive Test Ban Treaty (CTBT) by September 1999. Clinton informs Vajpayee that this is "a very important step" for the development of Indo-US relations.

—"Clinton Happy with Indian Stand on CTBT," Rediff on The Net, 30 January 1999, www.rediff.com.

28 January 1999

India's foreign minister Jaswant Singh says that "India is a restrained country" and it is unclear to him what the United States means when it says that India should adopt nuclear and missile restraint. *Indian Express*, citing Indian government sources reports that India is ready to sign the Comprehensive Test Ban Treaty (CTBT) once all the economic sanctions are lifted.

—Jyoti Malhotra, "India Not to Accede to US Pressure on Nuclear Issue," *Indian Express* (Mumbai), 29 January 1999, www.expressindia.com.

28 January 1999

In an interview, the former chairman of the Atomic Energy Regulatory Board (AERB) (1993-1996) A.

Gopalakrishnan claims that an accident at the Narora Atomic Power Station on 31 March 1993 brought the reactor close to a partial meltdown. The fire that broke out in the generating unit of the reactor "burned through both regular and emergency power cables, which were bundled together. The reactor's coolant pumps halted, and the entire station was plunged into darkness. The control room's 400 plus instrument panels that indicate reactor status went blank. Smoke poured into control room..." According to Gopalakrishnan, prompt reaction by the personnel helped to avert possible "partial meltdown or a localized explosion": four crew members "groped up the steps beside the reactor to a platform 18-storey high, where they cranked open valves and poured in a boron solution" into the reactor's core halting the nuclear reaction. However, AERB secretary K.S. Parastharthy denies the possibility of a meltdown at Narora and says that boron was released "as a measure of abundant caution."

Gopalakrishnan contends that India has serious problems with old-vintage CANDU-type reactors that lack emergency core-cooling systems. He also says that India's General Electric reactors, built at Tarapur in 1969, have "many critical components and welded joints in locations that cannot be inspected." Such a design that does not allow for "assessing the health of these crucial components from time to time" will not be permitted to operate anywhere in the world today, he says. Gopalakrishnan confirms that India's nuclear installations use outside labor and sometimes military personnel "to clean up radioactive areas." The cumulative radiation exposure of such workers is never measured, he charges. Gopalakrishnan states that Atomic Energy Commission (AEC) chairman R. Chidambaram regularly gathers commission members to "coach each one what to say and what not to say."

—"Doomsday Averted," *Far Eastern Economic Review*, 4 February 1999; in ProquestDirect,

www.proquest.umi.com; "The Perils of Power," *Far Eastern Economic Review*, 4 February 1999; in ProquestDirect,

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www.proquest.umi.com; "Narrowly Averted Meltdown in 1993," *Hindu* (Chennai), 29 January 1999, www.hinduonline.com.

27 January 1999

Speaking at the conference on Asian Security in the 21st Century in New Delhi, defence minister George Fernandes says it is important that nuclear doctrines of nuclear weapon states are "in harmony" with the concepts of cooperative security and commitment of no-first-use in order to reduce the risk of accident and miscalculation. Fernandes says that global disarmament is another urgent issue to be addressed.

—"Fernandes Presses for No-First-Use Pledge," Rediff on The Net, 27 January 1999, www.rediff.com.

26 January 1999

US Assistant Secretary of State for South Asian Affairs Karl F. Inderfurth says the United States is ready for the slow paced negotiations with India and Pakistan since "difficult issues need more discussion." In addition, the United States is determined to work with both countries to address "their security concerns in a way that moves them towards the global nonproliferation regime." Inderfurth says the issue of World Bank loans for India is on the agenda and America's ultimate goal is "to remove all sanctions." However, the pace of sanctions rollback will depend on the progress made during the talks.

—K. Arora, "US Expects No Immediate Breakthrough in Jaswant-Talbott Talks," Rediff On The Net, 27 January 1999, www.rediff.com; Chidanand Rajghatta, "Loan Blockade to Figure in Indo-US Talks," *Indian Express* (Mumbai), 28 January 1999, www.expressindia.com; Sridhar Krishnaswami, "Talbott to Pursue P-5 Benchmarks," *Hindu* (Chennai), 27 January 1999, www.hinduonline.com.

24 January 1999

India's Ambassador to the United States Naresh Chandra says the fact that India has offered not to bloc the Comprehensive Test Ban Treaty's (CTBT) entry into force. This offer indicates that India has met conditions on the US wish list "half way." Chandra says there should be a "proper package" for India to move further. Chandra also points out that the two sides agreed to adhere to "harmonizing interests" rather than following a quid pro quo principle. According to Chandra, there is now a "full recognition" of India's security requirements. Chandra states the United States is going beyond prescribed Glenn amendment sanctions to block international financing for India. He says that the Asian Development Bank and Japan follow US behavior. Chandra notes that the US position is not conducive to progress in the talks since "it created [a] negative environment."

—Sridhar Krishnaswamy, "CTBT: 'India Has Come a Long Way'," *Hindu* (Chennai), 24 January 1999, www.hinduonline.com; Chidanand Rajghatta, "Loan Blockade to Figure in Indo-US Talks," *Indian Express* (Mumbai), 28 January 1999, www.expressindia.com.

22 January 1999

The Senior Director for Near East and South Asia in the US National Security Council Bruce Riedel says that during the eighth round of Indo-US talks, US Deputy Secretary of State Strobe Talbott is going to suggest "new ideas" for resolving nuclear differences with India. Without going into details, Riedel states that India must make sufficient progress on nonproliferation issues before the United States can consider indefinite extension and lifting of the sanctions imposed in the wake of the May 1998 nuclear tests.

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—Sridhar Krishnaswamy, "Talbot Remark Was Misread, Says US," *Hindu* (Chennai), 24 January 1999, www.hinduonline.com.

22 January 1999

Russia declines to recognize India as a nuclear weapon power. Russian Foreign Minister Igor Ivanov says "the issue is not on the agenda." According to Ivanov, Russia will attempt to strengthen cooperation with both India and China during 1999. The statement is made a day after the Russian Ambassador to India Albert Chernyshev expressed an understanding of India's "internal and external difficulties" in the nuclear field and expressed satisfaction with New Delhi's approach" on the issue.

—"Russia Rules Out Recognizing India as Nuclear Power," *Times of India* (Mumbai), 23 January 1999, <http://timesofindia.indiatimes.com>.

21 January 1999

US Ambassador to India Richard Celeste says "it is in India's interest to articulate in concrete terms" what it means by a minimum credible deterrent and "how it works." Celeste asserts that it is solely up to the Government of India to decide what India's defense and security needs are. He also says the US government is not demanding that India reveal any sensitive security-related information. Rather, "between the need for a level of secrecy and the theme of minimum deterrence there is a lot of room for a more concrete description of what that involves."

—K.V. Krishnaswamy, "Celeste Defends Demand on Deterrence," *Hindu* (Chennai), 23 January 1999, www.hinduonline.com.

21 January 1999

US Assistant Secretary of State for South Asian Affairs Karl F. Inderfurth delivers a speech at the Foreign Policy Institution in Washington, DC. Commenting on the progress in Indo-US talks, Inderfurth says the horizons for Indo-US cooperation are "boundless." He recognizes that the issues under discussion "are very difficult, of fundamental importance to all concerned and related to the history of the region that has had more than its security concerns." Inderfurth says that this is not prevention but "management of thresholds that have already been crossed" that dominates the US relations with South Asia. According to Inderfurth, as the Indo-US relationship matures, the US "interaction with India will be less prone to misunderstanding and assume a proper equilibrium."

—"Inderfurth Paints Rosy Picture of Indo-US Relations Ahead of Jaswant-Talbot Talks," Rediff On The Net, 22 January 1999, www.rediff.com.

20 January 1999

National Security Adviser and the Principal Secretary to the prime minister, Brajesh Mishra pledges to the British Foreign Office Minister Derek Fatchett that India will not explode any new nuclear device before signing the Comprehensive Test Ban Treaty (CTBT).

—Michael Binyon, "India Renounces Nuclear Testing," *London Times* (London), 21 January 1999; in Early Bird 21 January 1999, <http://ebird.dtic.mil>.

19 January 1999

Under the framework of the 1986 Indo-Vietnamese Agreement for cooperation in the field of peaceful uses of

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atomic energy, India and Vietnam sign an accord on cooperation in the field of nuclear energy. The "Detailed Cooperation Plan for 1999" is signed by Atomic Energy Commission (AEC) chairman Dr. R. Chidambaram and the chairman of the Vietnam Atomic Energy Commission Professor Tran Huu Phat in Hanoi. The Plan is a sequel to the Memorandum of Understanding the two sides signed in February 1998. Under the plan, India is to set up a "Nuclear Training Center" in Dalat city in Vietnam, as well as train Vietnamese scientists and engineers at Indian nuclear facilities. Work on the construction of the Center will begin in 1999 and will be completed by 2000. India will train Vietnamese scientists and engineers in the following areas: utilization of research reactors, reactor operation issues, nuclear science and technology for applications in a variety of fields ranging from industry and agriculture to environment and medicine. India will also undertake to provide training in the areas of nuclear power, nuclear materials, and nuclear fuel.

—P.S. Suryanarayana, "India, Vietnam Sign Pact on N-Energy Cooperation," *Hindu* (Chennai), 21 January 1999, www.hinduonline.com.

16 January 1999

Deputy Secretary of State Strobe Talbott addresses a conference on 'Diplomacy and Preventive Defense' at Stanford University in California. In his address, Talbott acknowledges the "irreversible fact" of India and Pakistan going overtly nuclear. He points out several steps for India and Pakistan "to move in the right direction" in order to enhance their security after they have crossed the nuclear threshold. These steps include intensification of contacts and confidence-building measures, including the issue of Kashmir; adhering to the Comprehensive Test Ban Treaty (CTBT); "making possible" a moratorium on fissile material production; "demonstrating prudence and restraint in the development, flight testing and storage of ballistic missiles and nuclear-capable aircraft;" and strengthening their export control laws. According to Talbott, the essence of the US position is to ensure that both countries, while pursuing "their ill-advised reliance on nuclear deterrence," are not jeopardizing "the other, political and economic dimensions of their own safety." Acknowledging India's democratic tradition, Talbott notes that "if India's democracy continues to flourish, it can exercise a positive influence on those countries in East Asia where democracy is either in jeopardy or only a gleam in the eye of would-be reformers." Talbott points out the inevitability of controversial issues if the United States attempts to "hold India's and Pakistani feet to the fire" and insist on the countries' adherence to the NPT as non-nuclear weapon states and banning flight-testing of missiles as a precondition for sanctions relief. He notes that this approach "will make the best enemy of the good." Referring to Indo-US dialogue, Talbott notes that while the United States does not make a claim to have "a formal mandate or proxy" from any other country or organization, it will adhere to the communiqués issued by P-5, G-8 and the South Asia Task Force in June 1998.

—Strobe Talbott, "Dialogue, Democracy and Nuclear Weapons in South Asia," Address at the Conference on Diplomacy and Preventive Defense at Stanford University, 16 January 1998, the US Department of State, www.state.gov.

Mid-January 1999

Atomic Energy Commission (AEC) Chairman Dr. R. Chidambaram says that India has an adequate scientific database "for designing...a credible minimum deterrent." However, Chidambaram adds, should the government change the 'minimum' parameters of the proposed deterrent in terms of yields and performance criteria, then

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tests will become necessary.

—Cited in, Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 427.

15 January 1999

India's Minister of State for External Affairs Vasundhara Raje Scindia says that India and the United States have "narrowed down" the issues and are moving "in the right direction." According to Raje, Indo-US talks over the past six months have been "very crucial and helpful" for mutual understanding.

—"India Satisfied over Arms Talks with US," United Press of India (New Delhi), 15 January 1999.

14 January 1998

The United States rejects permission for eight senior US physicists from the Fermi National Accelerator Lab and the Argon National Lab to participate in an international symposium on particle physics at the Tata Institute of Fundamental Research (TIFR) in Mumbai. TIFR is on the list of sanctioned entities issued in November 1998. However, 25 US scientists from private institutions and universities attend the symposium.

—Pallava Bagla, "Washington Blocks 8 US Scientists from TIFR Physics Seminar," *Indian Express* (Mumbai), 15 January 1999, www.expressindia.com.

Mid-January 1999

China publicly questions the legitimacy of the US-India nuclear dialogue. According to the Director-General of the Department of Arms Control and Disarmament in China's Ministry of Foreign Affairs, Ambassador Sha Zukang, negotiating with India the issues of "nuclear deterrence capability" violates the UN Security Council resolution 1172. Sha also says it is very "unhelpful to publicly support India's permanent membership in the UN Security Council soon after its nuclear tests."

—C. Raja Mohan, "China Slams India's Nuclear Talks," *Hindu* (Chennai), 18 January 1999, www.hinduonline.com.

Mid-January 1999

In an address at the seventh Carnegie International Conference on Nonproliferation in Washington, DC, India's Deputy Chief of Mission T.P. Srinivasan says: "In carrying out the [nuclear] tests in May 1998, India did not violate any international agreement, but merely underscored the point that if some nuclear powers are here to stay, including those in our immediate neighborhood, then India has no choice but to maintain its minimal, assured nuclear/missile capabilities." Srinivasan reiterates India's rejection of a "South Asian regional nonproliferation regime" and indicates that India's right to minimum credible deterrent is non-negotiable.

—"India Refuses to Accept Regional Non-Proliferation," Rediff on The Net, 13 January 1999, www.rediff.com; C. Raja Mohan, "China Slams India's Nuclear Talks," *Hindu* (Chennai), 18 January 1999, www.hinduonline.com.

Early January 1999

In an interview with *India Today*, India's Minister for External Affairs Jaswant Singh says that the nuclear tests India carried out on 11-13 May 1998 were "a continuity [of the policy held by successive Indian governments] inasmuch as development of technology." Singh calls the tests a defining event "in the last quarter of the century...not simply in terms of scientific and technical experiment but also as a switch from what was earlier a covert attitude to an

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overt policy frame." Singh argues that India, having carried out these tests, acquired "much-needed strategic space," as well as strategic autonomy. Speaking about the progress of Indo-US talks, Singh notes that the goal of the talks is not to "resolve" the differences but to "harmonize" them. He points out that there is no going back on India's weaponization program, missile development and flight testing program. He also indicates that there is an understanding of these issues in Washington. Singh points out that the concept of minimum deterrence is not a "physical quantification" but rather an "enunciation of fixity" that is "to be determined in accordance with the reality assessment of the security situation." According to Singh, India is moving "towards achieving a national viewpoint" on the Comprehensive Test Ban Treaty (CTBT) issue.

—Prabhu Chawla and Raj Chengappa, Interview: Jaswant Singh, "Let's Not Take the Worm's Eye View," *India Today*, 11 January 1999, www.india-today.com.

8 January 1999

Senior Advisor at the US Department of State's South Asia bureau George Pickart says the list of Indian entities sanctioned for suspected dual technology use "has been drawn on the basis of available information and can be revised if other evidence is provided." Pickart adds that the US Congress might expand the waiver of sanctions provided in the November 1998 list by the time the waiver is due for renewal on 21 October 1999. According to Pickart, the situation with the loans from the World Bank will not be subject to change soon.

—Sushma Ramachandran, "US Willing to Revise Entities List," *Hindu* (Chennai), 8 January 1999, www.hinduonline.com.

7 January 1999

Pakistan's High Commissioner to India Ashraf Jehangir Qazi says that Pakistan wants to institutionalize a regime of restraints in both conventional and nuclear fields to minimize the risk of accidents and an uncontrolled arms race in South Asia. Qazi speaks about the need to have "concrete and positive discussions on these issues" and come up with confidence-building measures. Indian and Pakistani foreign secretaries are scheduled to meet in New Delhi in February 1999.

—"Pakistan Offers to Discuss Regime of Restraints," *Hindu* (Chennai), 7 January 1999, www.hinduonline.com.

6 January 1999

US Ambassador to India Richard F. Celeste says the United States wants to know "concrete terms" for India's minimum nuclear deterrent so that the proposed deterrent is not perceived as an "open-ended threat" by India's neighbors. The Indian government reiterates that India's proposed nuclear deterrent "is not a fixity" and dismisses the US demand as "inconsequential."

—"India Dismisses US Demand on Minimum Nuclear Deterrence," *Hindustan Times* (New Delhi), 6 January 1999, www.hindustantimes.com.

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1998

1998

The nuclear waste immobilization plant (WIP) in Trombay reaches the last phase of mechanical completion; the WIP at Kalpakkam also nears completion.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 4.

1998

The lead mini-cell facility for reprocessing fuel from the fast breeder test reactor (FBTR) at Kalpakkam reaches final stage of completion; it is scheduled to be commissioned in July 1999. The Department of Atomic Energy (DAE) also conducts commissioning tests for uranium-233 recovery from irradiated thorium rods.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 4.

1998

The Nuclear Fuel Complex (NFC) records its highest production of pressurized heavy water reactor fuel bundles and reactor grade zirconium sponge. It also begins operating the New Zircaloy Uranium Fuel Assembly Plant and its Natural Uranium Oxide Fuel Project begins tail operations.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, pp. 3-4.

1998

The Department of Atomic Energy (DAE) reports that the performance and safety record at India's eight heavy water plants is satisfactory; the Tuticorin and Baroda heavy water facilities completed more than 7.3 million and 8.43 million man-hours of continuous operation during 1998-1999.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 3.

1998

The Nuclear Power Corporation of India Ltd. (NPCIL) reports that India's 10 operating nuclear power plants have a total generating capacity of 1,840MW. "During the period from 1 April 1998 to 31 January 1999, the gross generation was 9,900 million units with a capacity factor of 73 percent," reports the Department of Atomic Energy's (DAE) Annual report. The Tarapur-1 nuclear power station operated at 95 percent of full capacity in the months of May and August to November 1998. The 150MW Unit 1 of the Rajasthan Atomic Power Station (RAPS) operated at maximum capacity except for two shutdowns to modify the turbine blades and general maintenance. The coolant channel replacement and system upgrade work on RAPS-2 was completed ahead of schedule and the unit was synchronized to the grid on 6 June 1998. NPCIL also reports that the Kaiga-2 unit is expected to reach criticality by June 1999 and Kaiga-1 by June 2000. Both the Kaiga units should generate 2,420 million units annually at a generating capacity of 62.8 percent. Units 3 and 4 of RAPS are scheduled to reach criticality by July 1999 and July 2000. Excavation for the two 500MW pressurized heavy water reactors at Tarapur started in October 1998; both units are expected to become critical in October 2005 and July 2006, respectively.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 2.

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29 December 1998

Russian Ambassador to India Albert S. Chernyshev says India could "get accommodated" in the international technology control regimes after a "certain process" had unraveled.

—"Russia for Gradual Lifting of Global Hi-Tech Curbs," *Hindu* (Chennai), 30 December 1998, www.hinduonline.com.

25 December 1998

External affairs minister Jaswant Singh says that India is ready for a practical engagement of the great powers based on a "problem-solving" approach.

—Raja Mohan, "Foreign Policy: A New Pragmatism," *Hindu* (Chennai), 23 December 1998, www.hinduonline.com.

23 December 1998

India's Minister of State for External Affairs, Ms. Vasundhara Raje tells parliament that Indian scientists have clearly established the total yields of the devices tested on 11 May 1998 and the yields are in conformity with the announced values. She says that four different methods of analysis were used to estimate the yield from the nuclear tests. The methods, which included global seismic data evaluation and close-in acceleration measurement, have confirmed that a fission device of 15kt and a thermonuclear device of 45kt were tested on 11 May [DAE and DRDO official statement of 17 May indicated 12kt and 43kt]. Ms. Raje says that drilling operations at the site of the thermonuclear test are under way and similar operations will be undertaken at the site of the fission blast. The analysis obtained from samples from these operations thus far "conforms to the predicted behavior of the tested devices."

—"India Did Detonate Thermonuclear Device," *Hindu* (Chennai), 24 December 1998, www.hinduonline.com.

20-22 December 1998

Russian Prime Minister Yevgeny Primakov visits India. A press statement issued at the conclusion of the visit states that the two sides expressed "satisfaction over their continuing cooperation in the peaceful uses of atomic energy" and "over progress in a broad, mutually beneficial military-technical cooperation during recent years, which has good prospects."

—"Text of Indo-Russian Statement," *Hindu* (Chennai), 23 December 1998, www.hinduonline.com.

16 December 1998

Prime Minister Atal Bihari Vajpayee addresses the Indian parliament. He reiterates that "India's commitment to disarmament remains undiluted." Vajpayee states that "the [nuclear] option that was exercised in May 1998 was a continuation of a decision taken near 25 years earlier, during which period India had demonstrated an exemplary nuclear restraint, given the exceptional security related complexities of our region." He says "successive Indian governments continued to safeguard this option, demonstrate our capability, and take such steps as were necessary to ensure the viability of the option through weaponization." Vajpayee says that during the Indo-US talks, India has "firmly put across [its] security concerns and the imperative of maintaining a minimum, credible, nuclear deterrent." He notes that after six rounds of talks, Indo-US discussions narrowed down to four issues: the Comprehensive Test Ban Treaty (CTBT), the Fissile Material Cut-Off Treaty (FMCT), export controls, and defense posture. With regard to the CTBT, Vajpayee notes that "for the successful conclusion of the talks, creation of a

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positive environment by our interlocutors is a necessary ingredient." He reassures the parliament that India's move towards signing the CTBT will not "come in the way of our taking such steps as may be found necessary in future to safeguard our national security. It does not constrain us from continuing with our R&D programs, nor does it jeopardize in any manner the safety and effectiveness of our nuclear deterrent in the years to come." Vajpayee says that India is willing to "work for the early conclusion" of the non-discriminatory FMCT "that will end the future production of fissile material for weapons purposes." He says, however, that at this stage India is not ready to announce a moratorium on fissile material production.

Vajpayee indicates that Indo-US talks are based on the premise that "India will define its own requirements, for its nuclear deterrent, on its own assessment of the security environment." Regarding India's defense posture Vajpayee says "Ours will be a minimum credible deterrent, which will safeguard India's security, the security of one-sixth of humanity, now and into the future." He says the National Security Council "will make important contributions to elaborating these concepts." Vajpayee states that his government "remains unequivocally opposed to any suggestions that seek to place India at technological disadvantage through intrusive or sovereignty violative measures." He also says that India will continue to "take initiatives in the international forums towards fulfilling the objective of complete elimination of all nuclear weapons."

—PM's Statement in Parliament on, "Bilateral Talks with United States," 15 December 1998, Ministry of External Affairs, the Government of India, www.meadev.nic.in.

10 December 1998

External affairs Minister Jaswant Singh says that the Indo-US dialogue has resulted in "some progress." According to Singh, there is now some understanding of India's security concerns and requirements. The dialogue will focus on the four major issues: the Comprehensive Test Ban Treaty (CTBT), Fissile Material Cut-Off Treaty (FMCT), export controls, and defense posture.

—"Some Progress' in Indo-US Talks: Jaswant," Rediff on the Net, 10 December 1998, www.rediff.com.

8 December 1998

Defense Minister George Fernandes says India and "a country [United States] which has taken a hostile and negative position after India declared that it was a nuclear power" have not moved any closer to an understanding on the Comprehensive Test Ban Treaty (CTBT). Fernandes expresses hope that "a new round of talks" [scheduled for January 1999] "will yield the results."

—"No Headway in Indo-US Talks on CTBT: Fernandes," *Times of India* (Mumbai), 9 December 1998, <http://timesofindia.indiatimes.com>.

1 December 1998

US President Bill Clinton signs a Presidential Determination No. 99-7 addressed to the Secretary of State Madeleine Albright. With this document, he waives "the sanctions and prohibitions contained in section 101 and 102 of the Arms Control Act, section 620E(e) of the Foreign Assistance Act of 1961, and section 2 (b)(4) of the Export-Import Bank Act of 1945, insofar as such sanctions and prohibitions would otherwise apply to activities of the Export-Import Bank, the Overseas Private Investment Corporation, and the Trade and Development Agency with respect to Pakistan and India; assistance to Pakistan and India under "International Military Education and Training"

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program; making of any loan or providing of any credit to the Government of India or the Government of Pakistan by any US bank; and the extension of any loan or financial assistance to Pakistan by any international financial institution in support of the assistance program that Pakistan is negotiating with the International Monetary Fund."

—Presidential Determination No. 99-7, Memorandum to the Secretary of State, 1 December 1998, in Market Access and Compliance, www.mac.doc.gov.

December 1998

The closure of old ammonia plants in Baroda by the Gujarat State Fertilizer Corporation (GSFC) forces the Baroda Heavy Water Plant to halt heavy water production.

—Government of India, *Department of Atomic Energy Annual Report: 1999-2000*, p. 1.4.

27 November 1998

Pakistan rejects the possibility of mutual inspections of nuclear facilities with India. Pakistan's foreign secretary Shamshad Ahmed says that Pakistan will seek US help to persuade India to accept a "strategic restraint regime" in South Asia.

—Amit Baruah, "Pakistan Keen on Third Party Verification," *Hindu* (Chennai), 30 November 1998, www.hinduonline.com.

26 November 1998

Nucleonics Week reports that senior US intelligence analysts at the Lawrence Livermore National Laboratories have concluded that India's test of a thermonuclear design was a failure and India will need to test again if it wants to have a thermonuclear capability. It also cites one analyst as saying that "it would now be logical" for India to renew its 1997 request that the United States provide test simulation data to enable India to accept the Comprehensive Test Ban Treaty (CTBT).

—Mark Hibbs, "India May Test Again Because H-Bomb Failed, US Believes," *Nucleonics Week*, 26 November 1998.

26 November 1998

Indian government sources indicate that India intends to sign the Comprehensive Test Ban Treaty (CTBT) by September 1999 after taking parliament into confidence. The sources also suggest that the issue of "nuclear restraint" has been the major stumbling block in Indo-US negotiations with the United States, insisting that India cap its nuclear and missile capabilities. As far as fissile material cut off is concerned, India rejects an immediate moratorium on fissile material production. However, India will consider the issue of fissile material cut-off "in the course of multilateral negotiations" in Geneva when India will get "some idea on the exact position of the US on the FMCT [Fissile Material Cut-Off Treaty] issue."

—Anita Katyal, "No Freeze on N-Capability, US told," *Times of India* ((Mumbai), 26 November 1998, <http://timesofindia.indiatimes.com>; Muralidhar Reddy, "India May Sign CTBT Next Year," *Hindu* (Chennai), 26 November 1998, www.hinduonline.com; Sridhar Krishnaswami, "US, India Reach Common Ground," *Hindu* (Chennai), 27 November 1998, www.hinduonline.com.

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24 November 1998

The Principal Secretary to the Prime Minister and the National Security Advisor Brajesh Mishra says a National Security Advisory Board (NSAB) will be appointed to assist the National Security Council (NSC) in security policy formulation. The NSAB will consist of 24-30 persons from various fields outside the government. The Government of India also intends to restructure the Strategic Policy Group (SPG) created in 1996. The reconstituted SPG will include the three chiefs of the armed services, the Reserve Bank of India governor, secretaries of the departments of revenue, space and atomic energy, as well as the Scientific Advisor to the Defense Minister. The SPG will interact with the NSAB, Joint Intelligence Committee (JIC) and make recommendations to the NSC.

—Muralidhar Reddy, "NSC Advisory Board to Be Set Up," *Hindu* (Chennai), 25 November 1998, www.hinduonline.com.

23 November 1998

China says discussions for the next meeting of Joint Working Group with India are under way. China wants India to take concrete steps to improve bilateral relations. According to a Chinese embassy spokesperson in New Delhi, China hopes that besides solving the outstanding boundary problem, the two countries will "make efforts to develop bilateral relations in various fields, enhance mutual understanding and trust so as to create a favorable atmosphere." China plans to urge India to accept the Joint Communiqué, issued by the permanent members of Security Council and endorsed by G-8 members on 12 June 1998, to abandon its nuclear weapons program and sign the Comprehensive Test Ban Treaty (CTBT) "unconditionally and immediately." According to the spokesperson, China's attitude towards India has not changed after the tests and is based on the five principles of peaceful coexistence.

—K.K. Katyal, "China Claims 'Active Approach'," *Hindu* (Chennai), 24 November 1998, www.hinduonline.com.

19-20 November 1998

Jaswant Singh and Strobe Talbott meet for the seventh round of the Indo-US nuclear dialogue in Rome. The joint statement issued at the end of the meeting says that the two sides discussed disarmament, nonproliferation, and other bilateral issues, "as well as regional and international developments." The two sides discuss the report on the Indo-US meeting on export controls that took place in New Delhi on 9-10 November. During the talks, India expressed concerns about Indian entities on the US sanctions list and US attempts to deny India access to finances from international financial institutions. According to the Indo-US joint statement, both delegations found the talks "constructive and judge that they will contribute to an atmosphere that will facilitate further progress in establishing positive environment both sides seek." Reportedly, Strobe Talbott emphasized the urgency for India to sign the Comprehensive Test Ban Treaty (CTBT) while India reiterated its regional security concerns. The next round of talks is scheduled for January 1999 in New Delhi.

—Tara Shankar Sahay, "Jaswant-Talbott Talks End in Another Stalemate," Rediff on the Net, 20 November 1998, www.rediff.com; K.K. Katyal, "Jaswant, Talbott Talks 'Constructive'," *Hindu* (Chennai), 21 November 1998, www.hinduonline.com.

19 November 1998

The Indian government announces the institution of a National Security Council (NSC). The NSC will be chaired by the prime minister. It will consist of six members including the home minister, the defense minister, the external

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affairs minister, and the deputy chairman of the planning commission. According to the official announcement, the Principal Secretary to the Prime Minister Brajesh Mishra will be "national security adviser and the channel for servicing the council." The NSC will be tasked to carry out the India's strategic defense review (SDR) and formulate a command and control system for India's nuclear deterrent. The NSC will consist of three levels. A revamped joint intelligence committee (JIC) will act as its secretariat; a strategic policy group will provide inter-ministerial coordination and will consist of the cabinet secretary and union secretaries from the departments of external affairs, home, defense, finance, revenue and defense production, as well as the three chiefs of the armed services, the governor of Reserve Bank of India and the director of Intelligence Bureau. The national security advisory board (NSAB) will constitute the third layer and will comprise eminent persons from outside the government in the fields of external security, strategic analysis, internal security, science, and technology.

—"Six-Member National Security Council Formed," *Times of India* (Mumbai), 20 November 1998, <http://timesofindia.indiatimes.com>.

18 November 1998

The former chairman of the Atomic Energy Regulatory Board (AERB), Dr. A. Gopalakrishnan refutes the claims of the Department of Atomic Energy (DAE) and the Defense Research and Development Organization (DRDO) that enough data have been collected for computer simulation and sub-critical tests and that India can proceed to sign the Comprehensive Test Ban Treaty (CTBT). Gopalakrishnan says India is yet to validate its weapon designs and computer codes. Gopalakrishnan refers to the seismological estimates of the yield of the May 11 tests with the mean value of 12.5kt and standard deviation of 3kt that contradicts the cumulative yield announced by DRDO and DAE on 17 May (about 56kt). He discards as baseless the premise that the discrepancy arises due to inaccurate deduction of the yields from the multiple explosions. According to Dr. Gopalakrishnan, "if scientific data collection was the main objective" of May 1998 tests, a number of single-explosion tests should have been carried out since multiple simultaneous tests serve the purpose of studying the "synergetic effects on targets" and exploring "specific applications of multiple explosions" and not the verification of weapon designs.

—A. Gopalakrishnan, "How Credible is Our Deterrence," *Hindu* (Chennai), 18 November 1998, www.hinduonline.com.

17 November 1998

Speaking at the bi-annual meeting of International Association of Technology Assessment and forecasting Institutions in New Delhi, Dr. A.P.J. Abdul Kalam says India is strong and can "combat the sanctions." He also says that it is a duty of the "scientific and technology community" to ensure that "technology does not becomes pawn in the hands of geo-politics."

—"Technology Must Not Become a Pawn in the Geo-Politics Game: Kalam," Rediff on the Net, 17 November 1998, www.rediff.com.

17 November 1998

Atomic Energy Commission (AEC) Chairman R. Chidambaram says that US sanctions will not affect India's nuclear programs since India is self-reliant in the nuclear field. Chidambaram notes that India has a "comprehensive capability" in the nuclear fuel cycle that includes plant construction, power generation, reprocessing and waste management. According to Chidambaram, nuclear establishments in India are safe in all respects. Chidambaram

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also says the second unit of Kaiga nuclear power plant will become operational by December 1999.

—"India Self-Reliant in the Nuclear Field," *Hindu* (Chennai), 18 November 1998, www.hinduonline.com.

16 November 1998

During the "Nehru Memorial Lecture" at the Punjab University, former Atomic Energy Commission (AEC) Chairman Dr. Raja Ramanna says India does not need more nuclear tests as the May 1998 explosions were based on "the best" technology. Ramanna claims that Indian scientists "have achieved what is needed for the peaceful use of atomic energy." According to Ramanna, the imposition of US sanctions on India was an "overreaction" and will not hurt India.

—"More N-Tests Unnecessary, Says Raja Ramanna," Rediff on the Net, 18 November 1998, www.rediff.com.

13 November 1998

The US Department of Commerce publishes the list of Indian and Pakistani institutions linked to nuclear- and missile-related programs. These entities are to be denied the right to import goods with nuclear or military applications from the United States as stipulated in the Glenn Amendment.

—"US Puts Out Black List of Indian Firms," Rediff on the Net, 14 November 1998, www.rediff.com.

13 November 1998

India and Russia finalize a 10-year defense cooperation plan after a three-day meeting of the Indo-Russian Joint Working Group in Moscow. Under the plan, Russia agrees to help India build its first nuclear submarine and set-up an anti-missile system around India's major cities. According to press reports, Russia will assist India in integrating the nuclear power plant into the Advanced Technology Vessel (ATV) and in developing a submarine-launched ballistic missile. A new long-term defense cooperation agreement is expected to be signed in December 1998 during Russian President Boris Yeltsin's proposed visit to New Delhi.

—Vladimir Radyuhin, "India, Russia to Extend Defense Cooperation," *Hindu* (Chennai), 14 November 1998, www.hinduonline.com; "Major Indo-Russian Defense Deal to be Signed Next Month," Rediff on the Net, 17 November 1998, www.rediff.com.

9 November 1998

India and the United States begin talks on nuclear and missile-related export control issues. Alok Prasad, Joint Secretary in the Ministry of External Affairs (MEA), and US Deputy Assistant Secretary of State John Barker lead their respective delegations. Another round of Jaswant Singh-Strobe Talbott talks is scheduled for 19 November 1998 in Rome.

—"Indo-US N-Talks Reach Decisive Phase," Rediff on the Net, 9 November 1998, www.rediff.com.

8 November 1998

Prime Minister Atal Bihari Vajpayee says the US decision to lift some of the economic sanctions imposed on India in the aftermath of May 1998 tests vindicates India's stand on the nuclear issue and its self-defense requirement. Vajpayee says it is very difficult to isolate a country with the population of one billion people.

—"Vajpayee Finds US Action Discriminatory," *Hindu* (Chennai), 9 November 1998, www.hinduonline.com.

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7 November 1998

The Government of India acknowledges the Clinton administration's partial sanctions waiver and says the US decision is an indication of the advance in the Indo-US dialogue on disarmament and nonproliferation.

—K.K. Katyal, "Delhi Takes Note of Washington Move," *Hindu* (Chennai), 8 November 1998, www.hinduonline.com.

7 November 1998

The White House announces that United States will partially waive some sanctions against India and Pakistan imposed in the wake their nuclear tests in May 1998. The sanctions are waived in response to the efforts both countries made in the field of nonproliferation (moratorium on further testing, public commitment at the United Nations General Assembly to adhere to the Comprehensive Test Ban Treaty by September 1999, promise to strengthen export controls, participation in the Fissile Material Cut-Off Treaty negotiations in Geneva, and resumption of the Indo-Pakistani dialogue). The waiver will apply to activities of the Export-Import Bank, Overseas Private Investment Corporation, Trade and Development Agency operations in India and Pakistan, the removal of restrictions on the activities of US banks in India and Pakistan, and resumption of military-to-military relationships by way of restoring military education and training programs. The waiver will be valid until 21 September 1999.

—"Easing Sanctions on India and Pakistan," Statement by the Press Secretary, Office of Press Secretary, the White House, 7 November 1998; in Market Access and Compliance, www.mac.doc.gov.

6 November 1998

Prime Minister Atal Bihari Vajpayee says that US insistence on Indian "fissile material" deployment information is blocking the Strobe Talbott-Jaswant Singh talks on the Comprehensive Test Ban Treaty (CTBT). Vajpayee says the deployment will be determined by India's security compulsions. Vajpayee also divulges that Indo-US negotiations on the fissile material issue "are stuck because of different perceptions of the issue." Vajpayee notes that the attempt to isolate India after nuclear tests did not work because "international environment is now such that an increasing number of countries want to have bilateral relations with us."

—Janak Singh, "US Obduracy on N-Sites Holding Up Talks: PM," *Times of India* (Mumbai), 8 November 1998, <http://timesofindia.indiatimes.com>.

October-November 1998

Israel succumbs to US pressure and orders Israeli aerospace and defense firms to suspend pending defense deals to India. On 30 October 1998, an Israeli defense ministry official makes a statement saying that this is "a temporary, voluntary freeze that may or may not be adhered to depending on the circumstances." The official emphasizes the effort to coordinate actions with the "friends" in Washington but indicates that "sometimes national interests must prevail." Israel maintains that indigenous Israeli technology should not be subject to third country's export control regimes. However, the United States keeps the issue high on the agenda and plans to reintroduce it during meetings with Israeli officials at the US Department of State on 9 November 1998. India's ambassador to Washington Naresh Chandra says that India and Israel enjoy robust defense-industrial ties.

—Barbara Opall-Rome, "Israel, US Lock Horns over Transfers to India," *Defense News* (Springfield, VA), Vol.13, No. 44, 2-8 November 1998, pp. 3, 19; "Israel Defers Arms Sales to India," *Times of India* (Mumbai), 5 November 1998, <http://timesofindia.indiatimes.com>.

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October-November 1998

Mr. Dalip Lahiri, additional secretary in the Ministry of External Affairs (MEA), introduces India's resolution on "Reducing Nuclear Danger" to the first committee of the 53rd session of the United Nations General Assembly. The resolution calls for the de-alerting of nuclear forces and the revision of nuclear doctrines to adopt no-first-use policies as means toward reducing the risks of unintentional and accidental use of nuclear weapons. The resolution emphasizes that reduction of tensions due to the change in nuclear doctrines will have a positive impact on international peace and security. It also reiterates India's priority toward global nuclear disarmament.

—"India Moves Resolution on De-alerting N-Forces," Rediff on the Net, 3 November 1998, www.rediff.com.

30 October 1998

In an address to nuclear scientists and engineers at the Bhabha Atomic Research Center (BARC), Dr. Chidambaram says technology control regimes are meaningless. "We cannot, anymore, be considered of proliferation concern," he says "because five Pokhran '98 tests have shown that our knowledge of nuclear weapon designs is highly advanced." According to Chidambaram, the Indian "sophisticated and modern nuclear devices" are to be equated to several tests conducted by other nuclear weapon states since "these tests are of '98 vintage, their robust designs" are based on "today's knowledge of physics, material science, engineering and electronics," while "the old nuclear weapon states who begun testing in 50s had the design prepared on the basis of the then knowledge of science and engineering. They had to repeat tests as the knowledge grew but the basic design remained the same." Chidambaram also points out that the failure to detect India's sub-kiloton explosions was due to "software and analytical inadequacies" of the foreign seismologists in the face of "separated, simultaneous explosions." This failure exposed the weaknesses of the Comprehensive Test Ban Treaty (CTBT) monitoring system. According to Chidambaram, the seismic method was not the best way to assess India's nuclear tests since the seismic results could be manipulated and no global model that covers the entire earth exists. This is why the Department of Atomic Energy (DAE) released accelerometer results after the tests.

—"Nuclear Power, India's Important Need," *Hindu* (Chennai), 31 October 1998, www.hnduonline.com.

29 October 1998

Prime Minister Atal Bihari Vajpayee says India should be treated "at par" with other nuclear weapon states. Vajpayee says India will continue to work for the elimination of all nuclear weapons.

—"Treat India Like Other N-States: PM," *Hindu* (Chennai), 29 October 1998, www.hinduonline.com.

28 October 1998

Principal Secretary to the Prime Minister Brajesh Mishra says India wants to resolve all outstanding problems with China "in the spirit of friendship and cooperation." Mishra says India is not interested in the arms race with China or Pakistan and its nuclear weapons program is "purely defensive."

—"China Isn't Enemy, Says India," Rediff on the Net, 28 October 1998, www.rediff.com.

27 October 1998

India's nuclear submarine, or Advanced Technology Project (ATV), falls further behind schedule. Reports suggest that most of the money on the project has been spent on "obtaining design drawings from abroad, civilian construction work, establishing test beds, procuring related equipment, and overseas visits of key personnel."

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India has established a training facility to familiarize the personnel with the nuclear submarine's power plant. According to experts, the success of the ATV will lie in "the precision integration of an Indian-designed reactor to a matching hull." According to the former Atomic Energy Commission (AEC) chairman Dr. Srinivasan, The Bhabha Atomic Research Center (BARC) and the navy joined forces to build the submarine's power plant. Srinivasan says the team abandoned the idea to use plutonium as a fuel and intends to use "specially fabricated enriched uranium." The Defense Research and Development Organization (DRDO) coordinates the ATV project while obtaining inputs from DAE and the navy. The navy had sought a "technical audit" to assess whether the progress achieved thus far justifies the expenditure.

—Atul Aneja, "N-submarine Project Yet to Take Off," *Hindu* (Chennai), 28 October 1998, www.hinduonline.com.

26 October 1998

At the annual Sardar Patel memorial lecture titled "Second Vision for the Nation- Developed India," Dr. A.P.J. Abdul Kalam says India does not need to carry out any more nuclear tests to prove its "worth" because the technological capability of a country determines the number of tests required to become a nuclear power. By carrying out multiple tests simultaneously India has proven its technological capability. He says it is "ridiculous" to think India does not have proper command and control system. Kalam says India was able to overcome emerging challenges: "We fought against sanctions and technology denials and proved to the world that we can develop high technology in this country." According to Kalam, by the year 2020 India will emerge as "a developed country" and will possess indigenously developed high technology, "the main engine for economic build-up and national development."

—"We Proved Our Worth with N-Tests: Kalam," *Times of India* (Mumbai), 29 October 1998, <http://timesofindia.indiatimes.com>.

26 October 1998

Prime Minister Atal Bihari Vajpayee says India will not compromise its security interests in negotiations with Pakistan. He says the country is committed to find a "rightful place in [the] global arena" and the tests of 11 and 13 May were of a "far reaching strategic significance." They brought India "into the center of [the] international security debate." Vajpayee says indigenization is necessary to overcome the problem of technology denials.

—"No Compromise on Security Interests, Says Vajpayee," *Hindu* (Chennai), 27 October 1998, www.hinduonline.com.

16-18 October 1998

Indian and Pakistani foreign secretaries K. Raghunath and S. Ahmed begin bilateral talks. Pakistan proposes that both countries adopt measures to formalize the informal moratorium on nuclear tests, prevent a nuclear and missile race in the region, institutionalize measures to avoid a potential nuclear conflict, ensure a minimal deterrent capability, agree not to induct air- and sea-launched ballistic missiles, employ peaceful means for the settlement of disputes, create measures to prevent violations of airspace and territorial waters, and revive the pre-Simla ground border rules and prior notification of military exercises. India's responds with proposals of its own including exchange of views on security concepts and nuclear doctrines, increased exchange of information in the nuclear field and setting up a consultative mechanism to review and implement confidence-building measures. Chennai-based *Hindu* reports that both India and Pakistan had similar proposals to upgrade the existing hotline between the Director Generals of Military Operations and extend it to sector commanders, to review the existing

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confidence-building measures, as well as measures to cease hostile propaganda.

—Amit Baruah, "US Ideas for N-Restraint Discussed," *Hindu* (Chennai), 23 October 1998, www.hinduonline.com.

15 September 1998

Prime Minister Atal Bihari Vajpayee dedicates the Kalpakkam Reprocessing Plant (KARP), India's largest nuclear spent fuel reprocessing facility. KARP is designed to reprocess spent fuel from the Madras Atomic Power Station (MAPS) and has a reprocessing capacity of 100 tons per annum. KARP will also meet the plutonium needs of the prototype fast breeder reactor (PFBR).

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 14.

6 September 1998

Commenting on the issue of nuclear safety in India, Atomic Energy Commission (AEC) Chairman Dr. R. Chidambaram says that India has a "very good independent atomic energy regulatory board," well-trained operators and "decades of experience in designing, building and operating many nuclear research reactors and related facilities." Speaking of the thermonuclear device tested on 11 May, Chidambaram says it was a "staged thermonuclear explosive and its yield of 45 tons was very close to the calculated (expected value)." He also says that the approaching deadline for signing the Comprehensive Test Ban Treaty (CTBT) in 1999 was a factor in carrying out nuclear tests.

—"India's N-Safety Record Good: Chidambaram," *Hindu* (Chennai), 6 September 1998, www.hinduonline.com.

2 September 1998

At a press conference in Moscow, US President Bill Clinton and Russian President Boris Yeltsin express their commitment to follow the steps listed in the joint Communiqué endorsed by G-8 and the UN Security Council to persuade India and Pakistan to "reverse their arms race." India's defense minister George Fernandes says defense cooperation with Russia will "not be affected by such statements." He also says that the assumption "that the bomb is safe in the hands of a nuclear state but dangerous for people of South Asia is exaggerated and not acceptable."

—"US, Russia to Pressure India, Pakistan," *Hindu* (Chennai), 3 September 1998, www.hinduonline.com; "Indo-Russian Ties Will Continue: Fernandes," *Hindu* (Chennai), 3 September 1998, www.hinduonline.com.

1-3 September 1998

During press conference in Durban, the Principal Secretary to the Prime Minister of India Brajesh Mishra says the Minister of State for External Affairs Vasundhara Raje and Pakistani Foreign Minister Sartaj Aziz have reached a "broad understanding" to resume official-level talks that broke down in 1997 due to Pakistani insistence on resolving the outstanding Kashmir issue in the first place. He says the text of the agreement was worked out and will be released during the meeting of the prime ministers of both countries in New York on 23 September 1998.

—"Progress in Nuclear Talks with India: Sartaj Aziz," *Times of India* (Mumbai), 1 September 1998, <http://timesofindia.indiatimes.com>; "India, Pakistan Finally Break the Ice," 3 September 1998, Rediff on the Net, www.rediff.com.

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30 August 1998

US Assistant Secretary of State for South Asia Karl Inderfurth says the talks between India and the United States are designed to put Indo-US ties "on the most sound and secure footing possible for the future" and US sanctions against India will be lifted "as soon as possible." Inderfurth says the United States is working with both India and Pakistan "to identify as clearly as possible" a common ground and "find some ways to manage differences...It is quite clear that similarities between the United States and India are much more important than our differences."
—Chidanand Rajghatta, "American Sanctions Will Go Soon, Says Inderfurth," 31 August 1998, *Indian Express* (Mumbai), www.expressindia.com.

25 August 1998

Senior Ministry of External Affairs (MEA) officials say that both India and the United States, despite their persisting differences, are trying to reach a mutually acceptable compromise on the issues of nonproliferation and the Comprehensive Test Ban Treaty (CTBT). The Indian officials emphasize that United States should recognize India's security needs. They also claim that according to the unofficial reports from Washington, Strobe Talbott acknowledged nuclear collaboration between China and Pakistan, as well as the US failure to persuade China to stop its clandestine nuclear proliferation activities. According to MEA officials, Jaswant Singh is supposed to have argued that China, not Pakistan, is a major security threat for India.

—Tara Shankar Sahay, "Jaswant-Talbott Agree to Meet Yet Again," Rediff on the Net, 25 August 1998, www.rediff.com.

24 August 1998

In an interview to the Thailand daily *The Nation*, Prime Minister Atal Bihari Vajpayee says that India is a responsible nuclear weapon state and would be willing to provide formal security assurances to uphold the Southeast Asian Nuclear Weapon Free Zone under the Bangkok Treaty of 1995.

—"India is a Responsible Nuclear State: Vajpayee," *Times of India* (Mumbai), 24 August 1994, <http://timesofindia.indiatimes.com>.

24 August 1998

India's Deputy Chairman of the Planning Commission, Jaswant Singh, and the US Deputy Secretary of State, Strobe Talbott, engage in the fourth round of talks that began in June 1998. The talks take place in Washington, DC. Singh has meetings at the US Departments of Defense and Energy and meets with the Secretary of Energy Bill Richardson, Deputy Secretary of Defense John Hamre and Vice Chairman of the Joint Chiefs of Staff General Joseph Ralston. The Indian embassy press release states the talks were "serious and constructive, with the view of putting the relations between India and the United States on a sound and secure footing for the future. The two sides discussed the issues of disarmament and nonproliferation, as well as regional developments and the international situation." Mr. Singh and Mr. Talbot agree to meet again in the coming weeks; however, the date for the next meeting is not specified.

—"India-US Bilateral Relations," Press Release, 24 August 1998, Embassy of India, Washington, DC, www.indianembassy.org; Sridhar Krishnaswamy, "Jaswant-Talbott Talks 'Serious, Constructive'," *Hindu* (Chennai), 26 August 1998, www.hinduonline.com; Tara Shankar Sahay, "Jaswant-Talbott Agree to Meet Yet Again," Rediff on the Net, 25 August 1998, www.rediff.com.

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20 July 1998

Deputy Chairman of the Planning Commission of India Jaswant Singh and US Deputy Secretary of State Strobe Talbott continue the series of discussions in New Delhi on the issues of disarmament, security, and nonproliferation. Strobe Talbott is accompanied by the Vice Chairman of the Joint Chiefs of Staff General Joseph Ralston, US Ambassador to India Richard Celeste, Assistant Secretary of State for South Asia Karl Inderfurth, National Security Council representative Bruce Reidel, Robert Einhorn, and Matthew Daley. An Indian embassy press release in Washington, DC states the two sides "exchanged their strategic perspectives on regional and international developments." According to the press release, "the discussions were marked by a spirit of working together to find a common ground and narrow the gaps" in the perceptions of India and the United States. The next meeting is scheduled for late August 1998.

—Press Release, 20 July 1998, Embassy of India, Washington, DC, www.indianembassy.org.

June 1998

Washington Post reports that India is "within months of beginning construction of [a] nuclear-powered submarine capable of carrying nuclear warheads" with help from Russia.

—Kevin Sullivan, "Indian Nuclear Sub Plan Reported," *Washington Post*, 27 June 1998, p. 20; in Early Bird, 29 June 1998, <http://ebird.dtic.mil>.

24 June 1998

Atomic Energy Commission (AEC) chairman Dr. R. Chidambaram inaugurates a workshop on "energy for growth and sustainability" at the Indira Gandhi Center for Atomic Research (IGCAR) in Kalpakkam. He states that India is not dependent on others for nuclear technology and has a "comprehensive capability" in the entire nuclear fuel cycle. He cites the example of Rajasthan Atomic Power Station (RAPS) where "the entire coolant channels of the reactor were replaced at the fraction of the cost Canada would have charged." Chidambaram says that the Department of Atomic Energy (DAE) would "go out of its way to provide technical support to the research center." The budgetary allocations for nuclear power in 1998 amount to 9.3 billion rupees.

—"India Not Dependent on Others for N-Technology," *Hindu* (Chennai), 25 June 1998, www.hinduonline.com.

17 June 1998

Defense Minister George Fernandes says India went nuclear for the purpose of possessing a nuclear deterrent to "tackle some of the threats...from the north." According to Fernandes, India was going to mate its nuclear warheads with the missiles right after the tests but now India emphasizes its readiness to negotiate nuclear issues with Pakistan and the P-5 countries.

—John F. Burns, "India's Defense Minister Calls US Defense Policies 'Hypocritical'," *New York Times*, 18 June 1998, in Early Bird 18 June 1998, <http://ebird.dtic.mil>.

16 June 1998

Russian Atomic Energy Minister Yevgeny Adamov visits India. According to Interfax, Russia will provide the reactors for the Koodankulam nuclear power plant in Karnataka.

—"Russia Will Continue to Sell Conventional Weapons, N-Reactors to India," Rediff on the Net, 16 June 1998,

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www.rediff.com; Kevin Sullivan, "Indian Nuclear Sub Plan Reported," *Washington Post*, 27 June 1998, p. 20; in Early Bird, 29 June 1998, <http://ebird.dtic.mil>.

14 June 1998

The Government of India issues an official response to the Joint Communiqué of G-8 foreign ministers dated 12 June 1998. The government expresses its regret that the Communiqué did not take into consideration India's proposals (reiterated in the official statement issued on 6 June 1998). The statement emphasizes that "India's security concerns cannot be viewed in a narrow South Asian construct. Indeed, the pursuit of nonproliferation in an arbitrary selective regional context remains the fundamental flaw of the global nuclear disarmament regime. The Government of India cannot consider any prescriptions which have the effect of undermining India's independent decisionmaking. Like any sovereign nation, India will continue to take decisions in this regard on the basis of its own assessment and national security requirements."

—"Statement on G-8 Foreign Ministers Joint Communiqué," 14 June 1998, Embassy of India, Washington, DC, www.indianembassy.org.

13 June 1998

Prime Minister Atal Bihari Vajpayee calls for "progressive denuclearization" of the world in a global, comprehensive, and non-discriminatory fashion.

—"Vajpayee Calls for 'Progressive Denuclearization'," Rediff on the Net, 13 June 1998, www.rediff.com.

12 June 1998

The G-8 countries meet in London "to consider the serious global challenge posed by the nuclear tests carried out by India and Pakistan." The Joint Communiqué issued after the meeting urges India and Pakistan "to stop all further nuclear tests and adhere to the CTBT [Comprehensive Test Ban Treaty] immediately and unconditionally, thereby facilitating its early entry into force; to refrain from weaponization or deployment of nuclear weapons and from the deployment and testing of missiles capable of delivering nuclear weapons, and enter into firm commitments not to weaponize or deploy nuclear weapons or missiles; to refrain from any further production of fissile material for nuclear weapons or other nuclear explosive devices and participate, in a positive spirit and on the basis of the agreed mandate, in negotiations with other states in the Conference on Disarmament for a Fissile Material Cut-off Convention with a view to reaching early agreement; to confirm their policies not to export equipment, materials and technology that could contribute to weapons of mass destruction or missiles capable of delivering them, and undertake appropriate commitments in this regard." The Communiqué also urges both countries to "implement fully the confidence- and security-building measures" and resume the dialogue to reduce the tensions.

—G8 Foreign Ministers Communiqué on Indian and Pakistani Nuclear Tests, 12 June 1998, Lancaster House, London, University of Toronto Information Center, www.g7.utoronto.ca.

12 June 1998

Jaswant Singh, Deputy Chairman of the Planning Commission, meets US Deputy Secretary of State Strobe Talbott in Washington. During a televised interview, Jaswant Singh says he cannot "understand any circumstances" when India will use nuclear weapons. India carried out the nuclear tests to "acquire control over strategic autonomy," he

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says.

—"Jaswant Singh Meets Strobe Talbott," Rediff on the Net, 12 June 1998, www.rediff.com; "Jaswant Singh Rules Out India Deploying or Using N-Weapons," Rediff on the Net, 12 June 1998, www.rediff.com.

10 June 1998

Brajesh Mishra, Principal Secretary to the Prime Minister, meets Russian Foreign Minister Yevgeny Primakov to explain the rationale behind India's tests.

—"Brajesh Mishra Briefs Primakov," *Hindu* (Chennai), 11 June 1998, www.hinduonline.com.

8 June 1998

Atal Bihari Vajpayee addresses the Indian Parliament on the issue of UN Security Council resolution No. 1172 (6 June 1998) calling for India and Pakistan to abstain from further nuclear tests. Vajpayee rejects the resolution as "unacceptable." He says the decision to pursue nuclear and missile programs is based on the assessment of the national security requirements and is the right of every sovereign country. He reiterates that the Indian Government is "committed to initiatives that open negotiations for a global convention for the elimination of all nuclear weapons."

—Prime Minister's Statement in Rajya Sabha Regarding U.N. Security Council Resolution on 8 June 1998, Ministry of External Affairs, Government of India, www.meadev.nic.in; "We Will Be Our Own Nuclear Masters: PM," *Asian Age* (New Delhi), 8 June 1998, www.asianageonline.com; "U.N. Orders India, Pakistan to Sign Arms Control Pacts," *Washington Post*, 7 June 1998, p. A7.

7 June 1998

Principal Secretary to India's prime minister Brajesh Mishra meets British Prime Minister Tony Blair and Foreign Secretary Robin Cook in London and appraises them of the rationale behind India's nuclear tests.

—L.K. Sharma, "Brajesh Mishra Meets Tony Blair," *Times of India* (Mumbai), 7 June 1998, <http://timesofindia.indiatimes.com>.

6 June 1998

The UN Security Council passes resolution 1172 (1998). The resolution condemns the nuclear tests carried out by India and Pakistan and endorses the Joint Communiqué issued by P-5 Foreign Ministers on 4 June 1998. The resolution demands that India and Pakistan refrain from further nuclear testing, urges both countries "to exercise maximum restraint and to avoid threatening military movements, cross-border violations, or other provocations in order to prevent an aggravation of the situation." It calls on India and Pakistan "immediately to stop their nuclear development programmes, to refrain from weaponization or from the deployment of nuclear weapons, to cease development of ballistic missiles capable of delivering nuclear weapons and any further production of fissile material for nuclear weapons, to confirm their policies not to export equipment, materials or technology that could contribute to weapons of mass destruction or missiles capable of delivering them and to undertake appropriate commitments in this regard." The resolution recalls that in accordance with the NPT "India and Pakistan cannot have the status of a nuclear weapon state."

—Resolution 1172 (1998) Adopted by the Security Council at the 3890th Meeting on 6 June 1998, UN Security Council Resolutions 1998, S/RES/1172(1998), www.un.org.

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6 June 1998

India's Ministry of External Affairs (MEA) responds to the P-5 members' 4 June 1998 statement condemning India's nuclear tests. The MEA statement refers to the "flawed and discriminatory nonproliferation system that has legitimized the possession of nuclear weapons by a few countries and their presence in our neighborhood". According to the MEA statement, the threat to India's security due to the violation of the obligations under the NPT by its signatories, specifically China, has "compelled" India to carry out nuclear tests. "The clandestine transfer over the years of nuclear weapons technology and fissile material to our neighborhood is well known," the statement says. Nevertheless, India remains committed to "a comprehensive, universal and non-discriminatory global nuclear disarmament regime." India undertakes to observe a voluntary nuclear testing moratorium, to move to a *de jure* formulation of this declaration and is willing to participate in negotiations of the fissile material cut-off treaty at the Conference on Disarmament. The statement confirms India's readiness to discuss a bilateral no-first-use agreement with Pakistan, as well as with the other countries "bilaterally or in a collective forum."

—"Government of India Response to the P-5 Joint Communiqué," Press Release, 6 June 1998, Embassy of India. Washington, DC, www.indianembassy.org; Hari Ramachandran, "India Criticizes Big five on China, Rejects Intervention in Kashmir Dispute," *Washington Times*, 6 June 1998, p. A7.

5 June 1998

Vasundhara Raje, Minister of State for External Affairs, addresses India's parliament on the extent of China's assistance to Pakistan's nuclear program. Raje claims that China has helped Pakistan in setting up an unsafeguarded research reactor and a plutonium reprocessing facility. In addition, China has also supplied Pakistan with ring magnets, heavy water, and nuclear-related diagnostic equipment.

—Hari Ramachandran, "India Criticizes Big five on China, Rejects Intervention in Kashmir Dispute," *Washington Times*, 6 June 1998, p. A7.

4 June 1998

The foreign ministers of China, France, Russia, the United Kingdom, and the United States meet in Geneva "to coordinate their response to the grave situation created by the nuclear tests carried out in May 1998 by India and then by Pakistan." The Joint Communiqué states that India and Pakistan should stop further nuclear testing, "refrain from the weaponization or deployment of nuclear weapons, from the testing or deployment of missiles capable of delivering nuclear weapons, and from any further production of fissile material for nuclear weapons." The foreign ministers call on both states to "halt provocative statements, refrain from any military movements that could be construed as threatening, and increase transparency in their actions." The Joint Communiqué calls on India and Pakistan to adhere to the Comprehensive Test Ban Treaty (CTBT) "immediately and unconditionally, thereby facilitating its early entry into force, and to negotiate FMCT [Fissile Material Cut-Off Treaty] with the view of reaching early agreement." The foreign ministers state that "notwithstanding the recent nuclear tests, India and Pakistan do not have the status of nuclear weapon states in accordance with the NPT" and reiterate their goal to have all countries adhere to the NPT "as it stands."

—Full text of the Joint Communiqué, P-5 Foreign Ministers Meeting in Geneva, 4 June 1998, The Acronym Institute for Disarmament Diplomacy, London, www.acronym.org.uk.

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4 June 1998

India's Defense Minister George Fernandes informs parliament that "the government has approved the next phase of Agni for development of a longer-range system, using state of the art technologies developed indigenously."

—"Trishul Takes to the Seas, Agni to Get More Fire," Rediff on the Net, 4 June 1998, www.rediff.com.

2 June 1998

Brajesh Mishra, Principal Secretary to the Prime Minister, visits France to explain the rationale behind India's nuclear tests.

—"Brajesh Mishra Sent to France for Damage Control," Rediff on the Net, 2 June 1998, www.rediff.com.

1 June 1998

The government increases the defense budget by 14 percent. The budgets for the Atomic Energy Commission (AEC) and Department of Space (DOS) are also increased by 68 percent and 62 percent, respectively.

—John F. Burns, "Military Budget in India is Increased by 14 Percent," *New York Times*, 2 June 1998; in Early Bird, 2 June 1998, <http://ebird.dtic.mil>.

June 1998

A supplement to the 1988 Inter-Governmental Agreement (IGA) is signed between India and the Russian Federation. The 1998 IGA supplement includes unspecified terms and conditions. The original IGA calls for the Indo-Russian construction of a nuclear power station consisting of two 1,000MW pressurized water reactors (VVER-1000 classification). As of 1998-1999, site investigations had been completed and land for the project was acquired.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 50.

June 1998

According to a Bhabha Atomic Research Center (BARC) report, ground-based and airborne surveys carried out before and after the May nuclear tests have shown "no increase in the radiation level" around the Pokhran test site. The yield of thermonuclear design was "chosen" to minimize the damage to the nearby villages (the nearest one within the 5 kilometers from the test site). The report states that "the depths of emplacements were fixed so that the explosions were contained with no radioactive venting." According to the BARC report, 45 national seismological observatories indicated body waves between 5 and 5.4 magnitudes for 11 May with the yield ranging between 40 to 70 kilotons.

—Cited in, "Surveys Show No Radioactivity at Pokhran, Says BARC," Rediff on the Net, 17 June 1998, www.rediff.com.

June 1998

Nucleonics Week, citing sources "inside India's nuclear weapons development program," reports that India has developed about 25 plutonium metal cores since its first nuclear test in 1974. Most of the plutonium was produced by the CIRUS (estimated annual plutonium output: 10kg/year) and Dhruva (estimated annual plutonium output: 20-25kg/year) research reactors at the Bhabha Atomic Research Center (BARC), Trombay. The report states that the "cores are spherically shaped for the use in implosion nuclear bombs. Most or all the cores are identical or very

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similar to that exploded by India in 1974." None of the bomb cores has been transferred to the defense ministry and all of them remain with the Department of Atomic Energy (DAE). According to Indian defense analyst Manoj Joshi, the first batch of nuclear weapons based on the Pokhran I designs was developed in 1990. For safety purposes, the fissile cores were kept separate from the conventional explosives. Joshi also notes that Pokhran II brought India into "the age of more sophisticated weapons" (boosted-fission and fusion), which require complex assemblies that cannot be stored separately. The new designs also incorporate built-in safety features.

—Mark Hibbs, "India Made 'About 25 Bomb Cores' Since First Test in 1974," *Nucleonics Week*, 17 June 1998; W.P.S. Sidhu, "India Sees Safety in Nuclear Triad and Second Strike Potential," *Jane's Intelligence Review* (Coulsdon, Surrey), July 1998, p. 23; Manoj Joshi, "Handle With Care," *India Today*, 2 November 1998, www.india-today.com.

June 1998

Prime Minister Atal Bihari Vajpayee states that "India's nuclear doctrine is qualitatively different from that of other states" and, hence, India does not need "to replicate" similar command and control structures. According to Vajpayee India should have a "credible deterrent" to prevent "the use of these [nuclear] weapons." In the event sanctions are imposed, "India would have no option but to take measures to minimize their impact on the Indian economy."

—Kenneth J. Cooper, "Leader Says India Has a 'Credible' Deterrent," *Washington Post* 17 June 1998, p. 21; in Early Bird 17 June 1998, <http://ebird.dtic.mil>; Ramesh Chandran, "India Will Retaliate if Sanctions are Enforced," *Times of India* (Mumbai), 18 June 1998, <http://timesofindia.indiatimes.com>; C.K. Arora, "Rigid Sanctions Will Prove Costly to US: Vajpayee," Rediff on the Net, 17 June 1998, www.rediff.com.

June 1998

An Indo-Russian joint working group identifies "radars, electronic warfare, submarines and anti-ballistic missile systems as areas for future collaboration and joint production of hardware by Russian defense institutes and Indian agencies."

—Rezaul H. Laskar, "India, Russia Step up Defense Ties," *Asian Age* (New Delhi), 22 June 1998, www.asianageonline.com.

May 1998

The Department of Atomic Energy's (DAE) Heavy Water Board (HWB) exports 100 metric tons of heavy water to South Korea.

—Government of India, *Department of Atomic Energy Annual Report: 1998-1999*, p. 55.

May 1998

Senior Congress party leader Natwar Singh says the tests of May 11 and 13 "did not conform to the latest technology, as claimed." However, Singh does not comment further citing national security reasons.

—"Natwar Singh Blasts Advani, Fernandes," Rediff on the Net, 28 May 1998, www.rediff.com.

May 1998

According to a public opinion poll conducted in six Indian metropolitan centers, 91 percent of respondents support the nuclear tests, 82 percent favor building nuclear weapons, and 39 percent want India to sign the

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Comprehensive Test Ban Treaty (CTBT).

—Rahul Bedi, "India becomes Sixth Nuclear Weapons State," *Jane's Defense Weekly* (Coulsdon, Surrey), 20 May 1998, p. 4.

May 1998

Scientists from India's Tata Institute of Fundamental Research (TIFR) and the Institute of Mathematical Sciences protest against India's nuclear tests. The scientists argue that the money required for nuclear weaponization can be better spent to modernize India's educational and research facilities or fund developmental activities.

—T.S. Gopi Rethinaraj, "Indian Blasts Surprise the World, but Leave Fresh Doubts," *Jane's Intelligence Review* (Coulsdon, Surrey), July 1998, p. 22.

May 1998

According to *Jane's Intelligence Review*, preparations for Indian nuclear tests went undetected primarily because the Indian Space and Research Organization (ISRO) "had supplied a vast pool of data about the orbits and timings of various spy satellites" that enabled the team of scientists and engineers to avoid detection. The preparations for the 37th test of the Trishul short-range surface-to-surface missile at Chandipur, Orissa, were also used to divert attention from the Pokhran nuclear test site

—T.S. Gopi Rethinaraj, "Indian Blasts Surprise the World, but Leave Fresh Doubts," *Jane's Intelligence Review* (Coulsdon, Surrey), July 1998, pp. 19-22; Rahul Bedi, "...As Nuclear Test Preparations Avoid Detection," *Jane's Defense Weekly* (Coulsdon, Surrey), 20 May 1998, p. 5; Krishnan Guruswamy, "Operation Deception: How India Fooled CIA, China," *Asian Age* (New Delhi), 19 May 1998, www.asianageonline.com.

31 May 1998

India calls on the nuclear weapon states to start early negotiations on a nuclear weapons convention to deal with these weapons "in a global non-discriminatory framework."

—"India Appeals for Just Global Framework," Rediff on the Net, 1 June 1998, www.rediff.com.

30 May 1998

Dr. S.S. Bhandare, chief economist for Tata Services Ltd., estimates the effect of nuclear-related sanctions and increases in India's defense budget between 85 billion and 100 billion rupees.

—"Budget '98: Sanctions and Defense Can Cost India Up To Rs 100 Billion," Rediff on The Net, 30 May 1998, www.rediff.com.

30 May 1998

In its response to the statement by the president of the UN Security Council on Pakistan's nuclear tests, the Indian government expresses "astonishment" that the Security Council would urge India not to carry out further nuclear tests thereby ignoring India's repeated declarations of self-restraint. An Indian government statement emphasizes that "India remains firmly committed to a policy of friendly and cooperative relations with its neighbors, the promotion of peace and stability in the region and the resolution of outstanding issues through bilateral dialogue and negotiations." The statement also reiterates India's plea to the nuclear weapon states to join India "in opening early negotiations for a nuclear weapons convention so that these weapons can be dealt with in a global non-

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discriminatory framework as the other two weapons of mass destruction have been, through the Biological Weapons Convention and the Chemical Weapons Convention."

—"Statements on UN Security Council Reaction to Pakistan's Nuclear Tests," Press Release, 30 May 1998, Embassy of India. Washington, DC, www.indianembassy.org.

29 May 1998

The President of the UN Security Council issues a statement deploring the nuclear tests carried out by Pakistan on 28 May 1998 "despite overwhelming international concern and calls for restraint." The statement "strongly urges India and Pakistan to refrain from any further tests" and "expresses its concern at the effects of this development on peace and stability in the region."

—Statement by the President of the UN Security Council, 29 May 1998, UN Security Council Presidential Statements 1998, S/PRST/1998/17, 14 May 1998, www.un.org.

29 May 1998

Prime Minister Atal Bihari Vajpayee offers to sign an agreement with Pakistan on the "no-first-use" of nuclear weapons. The Indian government says it is unfortunate that Pakistan declared its nuclear tests as "India specific." According to India's defense minister George Fernandes, India had anticipated such a move by Pakistan and it was already "factored into" India's planning and defense strategy.

—"Vajpayee Renews No-First-Use Offer to Pakistan," Rediff on The Net, 29 May 1998, www.rediff.com;
 "Fernandes Blasts 'India Specific' Pakistani Tests," Rediff on The Net, 29 May 1998, www.rediff.com.

28 May 1998

In the aftermath of Pakistan's nuclear tests, Prime Minister Atal Bihari Vajpayee says India might reconsider its voluntary moratorium on nuclear tests. Speaking to the press, Vajpayee states that "India is prepared to meet any eventuality. We are committed to deterrence." He says that Pakistan's clandestine preparations "forced" India "on the path of a nuclear deterrent."

—Vijay Simha, "India May Review Moratorium," *Indian Express* (Mumbai), 28 May 1998, www.expressindia.com.

28 May 1998

Pakistani Prime Minister Nawaz Sharif announces that Pakistan has conducted five nuclear tests and settled the score with India. Criticizing India's tests earlier in the month, Sharif says that Pakistan had no choice but to follow suit.

—"Pakistan Conducts Five Nuclear Tests," *New York Times*, 28 May 1998, www.nytimes.com.

27 May 1998

Prime Minister Atal Bihari Vajpayee addresses the Indian Parliament on the issue of nuclear test series carried out on 11 and 13 May. He says, "India is now a nuclear weapon state... It is not conferment we seek, nor is it a status for others to grant... It is India's due, the right of one-sixth of the humankind." Vajpayee says that India will neither use nuclear weapons "for aggression or for mounting threats against any country" nor engage in the arms race. According to Vajpayee, India needs nuclear weapons only for self-defense, "to ensure that India is not subjected to nuclear threats or coercion."

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—Suo Motu Statement by Prime Minister Atal Bihari Vajpayee in Parliament on 27 May 1998, Ministry of External Affairs, Government of India, www.meadev.nic.in.

27 May 1998

The European Union decides to work for a delay in consideration of loans to India through the World Bank and other international financial institutions.

—"EU Against Sanctions, but Will Delay Loans for India," *Times of India* (Mumbai), 27 May 1998, <http://timesofindia.indiatimes.com>.

23 May 1998

Prime Minister Atal Bihari Vajpayee asserts that India is a nuclear weapon power and that no more tests are planned. According to Vajpayee, "the one and only reason for undertaking the tests was to ensure our security and to let the people of India and the world know that we have a credible deterrent."

—"No More Tests Are Planned," *Outlook*, 25 May 1998, www.outlookindia.com.

22 May 1998

The former Chairman of the Atomic Energy Commission (AEC) Dr. Raja Ramanna says India is blessed with an abundance of thorium than can be converted into uranium-233. According to Ramanna, this provides India with a "virtually inexhaustible source of cheap power." Ramanna urges the government to invest heavily in nuclear power stations "to help the country overcome its energy problem."

—"We Have Progressed Far in Terms of Technology," Rediff on the Net, 22 May 1998, www.rediff.com.

20 May 1998

Dr. B.K. Subba Rao, a former Indian Navy captain who worked on India's nuclear submarine program, challenges the Department of Atomic Energy's (DAE) claims that it successfully tested a thermonuclear device. According to Rao, only one explosion was registered by the seismic station within 437 kilometers from the blast area. Rao points out that seismic stations around the world recorded values between 15 and 25 kilotons. According to Rao, the positioning of the thermonuclear design within one kilometer of the two fission devices (both in one tube 300 meters apart) is "not sufficient to produce a phase difference and reduce the output of energy." Furthermore, the value of 45kt [DAE actually declared 43kt] is meaningless since the thermonuclear design must have a yield measured in megatons. Rao charges that the actual yield of the thermonuclear device tested on May 11 "was not even 30 kilotons." According to Rao, this result could mean the thermonuclear test either failed or that DAE probably tested a boosted-fission device.

—P. Rajendran, "India May Not Have an H-Bomb, Says Scientist," Rediff on the Net, 25 May 1998, www.rediff.com; "Scientist Questions DAE Claim," *Hindu* (Chennai), 20 May 1998, www.hinduonline.com; B.K. Subba Rao, "The H-Bomb Issue Is Crucial," *Frontline*, Vol. 15, No. 12, 6-9 June 1998, www.hinduonline.com.

19 May 1998

Naresh Chandra, India's ambassador to the United States says India wants to reach an agreement with the international community on the Comprehensive Test Ban Treaty (CTBT). According to Chandra, "India is willing to engage with key interlocutors from the nuclear weapon states and other countries to reach as soon as possible a

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position where we undertake the substantive undertakings contained in the treaty."

—"India Calls Beijing Envoy Back for Talks," *Asian Age* (New Delhi), 19 May 1998, www.asianageonline.com.

18 May 1998

The Deputy Chairman of the Planning Commission Jaswant Singh issues a statement confirming that "with the five tests conducted on 11 and 13 May, India has completed its planned series of underground tests. The decision to undertake this limited series of tests was taken after due consideration of all factors relevant to India's national security. These tests were not intended to threaten any country but address the security concerns of the Indian people and provide them with necessary assurance." According to the statement, India will strengthen its efforts for closer cooperation with the neighbors and intensify the dialogue with the key partners "on all issues that require collective consideration."

—Press Statement by Shri Jaswant Singh Deputy Chairman, Planning Commission, 18 May 1998, Ministry of External Affairs, Government of India, www.meadev.nic.in.

17 May 1998

The Department of Atomic Energy (DAE) and Defense Research and Development Organization (DRDO) issue a joint statement on the nuclear test series carried out on 11 and 13 May 1998. According to the statement, the three tests conducted on 11 May 1998 were that of "a fission device with the yield of about 12kt, a thermonuclear device with a yield of about 43kt and a sub-kiloton device. All three devices were detonated simultaneously." The statement says that "the yield of thermonuclear device tested on May 11 was designed to meet the stringent criteria like containment of the explosion and least possible damage to building and structures in neighboring villages." On 13 May two sub-kiloton devices were tested simultaneously. The yields of the devices "were in the range of 0.2 to 0.6kt." The fissile materials used in the five tests "are completely indigenous, and have been produced by local mastery over the relevant technologies by DAE establishments." The tests provided critical data for the validation of India's capability "in the design of nuclear weapons of different yields for different applications and different delivery systems." Furthermore, the tests "significantly enhanced" India's capability "in computer simulations of new designs" and will allow India to conduct "sub-critical experiments in the future, if considered necessary."

—Joint Statement by Department of Atomic Energy and Defense Research and Development Organization, Ministry of External Affairs of India, 17 May 1998, www.meadev.nic.in.

16 May 1998

Former Atomic Energy Commission (AEC) Chairman Dr. P.K. Iyengar says the ability to test three very different kinds of nuclear devices, fission and fusion, "unequivocally confers on India the status of a nuclear weapon state" irrespective of whether or not it chooses to maintain the stockpiles of these weapons.

—"N-tests Data Sufficient for Weapons Programme," *Hindu* (Chennai), 16 May 1998, www.hinduonline.com.

16 May 1998

The former Chief of Air Staff, Air Chief Marshal N.C. Suri says that while the data from 11-13 May tests suffices for initiating a weapons program, "additional tests would possibly be more prudent" for achieving higher levels of

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weapon sophistication.

—"N-tests Data Sufficient for Weapons Programme," *Hindu* (Chennai), 16 May 1998, www.hinduonline.com.

15 May 1998

India's former Prime Minister H.D. Deve Gowda opposes the government's decision to conduct nuclear tests. In a letter to Vajpayee, Gowda claims, "the scientists had approached two previous governments [during P.V. Narasimha Rao's and H.D. Deve Gowda's premierships] to continue the tests, once in 1995 and then in 1997." Gowda says he managed to convince the scientists that "the time was not ripe."

—T. Jayaraman, "Of Scientists and Nukes," *Frontline*, Vol. 15, No. 12, 6-9 June 1998, www.hinduonline.com.

15 May 1998

Atomic Energy Commission (AEC) Chairman R. Chidambaram announces that India tested a thermonuclear device on 11 May 1998. According to Chidambaram, "the fission trigger produced about 12 kilotons to activate the thermonuclear core to ultimately yield 45 kilotons." Prime Minister Vajpayee tells *India Today*, "We now have a capacity for a big bomb." When asked why the tests preceded the formation of the National Security Council, Vajpayee says that National Security Council would be tasked to carry out the first strategic defense review and "conducting of nuclear tests provides necessary information for this important exercise."

—T.S. Gopi Rethinaraj, "Indian Blasts Surprise the World, but Leave Fresh Doubts," *Jane's Intelligence Review* (Coulsdon, Surrey), July 1998, pp. 19-22.; "Nuclear Shock Wave," *India Today*, 25 May 1998, www.indiatoday.com; "We Have Shown Them That We Mean Business," Interview with the Prime Minister Atal Bihari Vajpayee, *India Today*, 25 May 1998, www.indiatoday.com.

15 May 1998

In response to the statement by the president of the UN Security Council on India's nuclear tests issued on 14 May 1998, the Indian government issues a press statement reiterating that India's tests are not directed against any country and "do not jeopardize peace and stability." The statement claims that India was "forced" to carry out the tests due to the "continuing threat posed to India by the deployment, overtly and covertly, of nuclear weapons in the lands and seas adjoining" India.

—Press Release Issued in New Delhi on UN Security Council Resolution on India's Nuclear Tests, 15 May 1998, Embassy of India, Washington, DC, www.indianembassy.org.

14 May 1998

The President of the UN Security Council issues a statement deploring the nuclear tests carried out by India on 11 and 13 May 1998 "despite overwhelming international concern and protests." The statement urges India "to refrain from any further tests" and expresses its "concern at the effects of this development on peace and stability in the region."

—Statement by the President of the UN Security Council, 14 May 1998, UN Security Council Presidential Statements 1998, S/PRST/1998/12, 14 May 1998, www.un.org.

14 May 1998

Japan imposes another set of economic sanctions on India estimated to cost India of \$1 billion, in the aftermath of

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the second test series on 13 May.

—"Finance Ministry Disputes US Sanction Impact While Japan Slaps Another Dose," *Financial Express* (Mumbai), 15 May 1998, www.expressindia.com.

14 May 1998

Australian Prime Minister John Howard announces the suspension of all defense and military cooperation and non-humanitarian aid to India. The Australian government recalls its defense attaché to New Delhi and orders officials involved in military training exercises in India to return home; Indian defense personnel involved in similar exercises in Australia are also asked to leave the country. All Australian ministerial and senior official visits to New Delhi are cancelled.

—"China Asks India to Sign CTBT," *Times of India* (Mumbai), 15 May 1998, <http://timesofindia.indiatimes.com>.

13 May 1998

The Congress Party urges the government to elucidate its reasons for carrying out nuclear explosions. The Congress spokesperson Ajit Jogi says, "It is an achievement which the entire nation is proud of and is an outcome of nearly forty years of sustained work in nuclear research." The Congress congratulates the scientists and engineers involved in the 11 and 13 May tests.

—"Congress Tells Government to Explain Changed Security Perceptions, E.K. Nayar Echoes View," Rediff on the Net, 13 May 1998, www.rediff.com.

13 May 1998

The Communist Party of India-Marxist (CPI-M) accuses the government of unilaterally reversing India's nuclear policy when the government has "a precarious majority and has not established its stability" and asks for "all parties and people to be taken into confidence before such major departures." CPI leader A.B. Bardhan says "the test of strength is a strong economy, not just weapons" and urges the government to clarify its policy on the nuclear issue. Both the Communist Party of India (CPI) and CPI-M question how the government can move towards signing the discriminatory Comprehensive Test Ban Treaty (CTBT) if there is a national consensus in the country not to do that unless the time-bound framework for nuclear disarmament is included in the treaty. Janata Dal spokesperson Mohan Prakash asks the government to explain the reasons for exercising the nuclear option. Prakash also asks what steps the government has undertaken to deal with the possible international and national repercussions and calls on the Bharatiya Janata Party (BJP) to "evolve a new consensus" on the signing of the CTBT.

—"Left Questions Nuclear Policy Change," *Asian Age* (New Delhi), 14 May 1998, www.asianageonline.com.

13 May 1998

Japan's Prime Minister Ryutaro Hashimoto says Japan will penalize India for its nuclear tests and suspends grants worth 4 billion yen (\$26 million). Japan also declines to host a meeting on international aid for India sponsored by the World Bank that was to be held later during 1998. Sweden also cancels a three-year aid agreement for the \$119 million. Elizabeth Wallton, the Swedish government spokesperson, says "Sweden has cancelled its cooperation with India as a result of Indian nuclear tests."

—"Japan Suspends Grants Worth \$30m," Rediff on the Net, 13 May 1998, www.rediff.com; Makiko Tazaki, "Japan

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Suspends Aid, Will Consider Extra Sanctions," *Asian Age* (New Delhi), 14 May 1998, www.asianage.com; "Sweden Cancels \$119m Aid Agreement," *Asian Age* (New Delhi), 14 May 1998, www.asianageonline.com.

13 May 1998

In response to India's nuclear tests, the United States imposes economic sanctions on India under Section 102 of the Arms Control Act (Glenn Amendment). The sanctions include "termination of assistance under the Foreign Assistance Act of 1961 (except for humanitarian assistance); termination of sales of defense items; termination of foreign military financing under the Arms Control Act; denial of any credit, credit guarantees, or other financial assistance by any department, agency or instrumentality of the United States government; the United States opposition to the extension of any loan for financial or technical assistance by any international financial institution; prohibiting the United States banks from making any loan or providing any credit to the government of India, except for the purposes of purchasing food or other agricultural commodities; prohibiting export of specific goods and technology subject to export licensing by the Commerce Department."

—"India Sanctions," Statement by the Press Secretary, 13 May 1998, The White House, Office of Press Secretary (Berlin, Germany), www.mac.doc.gov.

13 May 1998

Prime Minister Atal Bihari Vajpayee writes to US President Bill Clinton explaining India's decision to conduct nuclear tests. Vajpayee says that his government's decision was driven by "...deteriorating security environment, especially the nuclear environment, faced by India for some years past." The letter further states, "We have an overt nuclear weapon state on our borders, a state which committed armed aggression against India in 1962. Although our relations with that country have improved in the last decade or so, an atmosphere of distrust persists mainly due to the unresolved border problem. To add to the distrust that country has materially helped another neighbor of ours to become a covert nuclear weapons state." Vajpayee assures Clinton that India's "...[nuclear] tests are limited in number and pose no danger to any country, which has no inimical intentions towards India." Vajpayee also reiterates that India is ready to work with the United States "...in a multilateral or bilateral framework to promote the cause of nuclear disarmament." India is also "ready to participate in negotiations to be held in Geneva in the Conference on Disarmament for the conclusion of the fissile material cut-off treaty."

—Text of the Indian Prime Minister's Letter to the American President, 13 May 1998, Embassy of India, Washington, DC, www.indianembassy.org.

13 May 1998

India conducts two more sub-kiloton nuclear tests at 12:21 p.m. (local time). The Indian government announces that the planned test series is now complete. A government press release says that the tests were conducted "to generate additional data for improved computer simulation of designs and for attaining the capability to carry out sub-critical experiments, if considered necessary." According to the official statement, no radioactivity was released in the atmosphere. The government reiterates its readiness to undertake some actions under the Comprehensive Test Ban Treaty (CTBT) as proposed on 11 May 1998.

—"Planned Series of Nuclear Tests Completed," Official Press Release, Ministry of External Affairs, 13 May 1998, www.meadev.nic.in.

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12 May 1998

Canadian Deputy Prime Minister Herb Grey announces that Canada is recalling its High Commissioner to New Delhi as a protest against India's nuclear tests.

—"Canada Recalls High Commissioner," *Asian Age* (New Delhi), 14 May 1998, www.asianageonline.com.

12 May 1998

Former Atomic Energy Commission (AEC) Chairman P.K. Iyengar says that three explosions were needed to test three different kinds of weapons: a sub-kiloton device that could be fired as an artillery shell or dropped from a combat aircraft; a fission device that could be dropped from a bomber plane; and a thermonuclear design. According to Iyengar, the thermonuclear design contained only a small portion of tritium while most of its explosive force came from a fission device. The explosion showed that the "thermonuclear technology worked" and India does not need to "go for a megaton explosion while testing an H-bomb" unless it plans "for a total destruction of the opposite side."

—Willis Witter, "New Delhi Ignores Critics, Says More Tests are Needed," *Washington Times*, 13 May 1998, www.washtimes.com.

11 May 1998

Prime Minister Atal Bihari Vajpayee announces that at 3:45 p.m. (10:15 GMT/6:15 EDT) India conducted three nuclear tests at the nuclear test site in Pokhran, in the state of Rajasthan. According to the prime minister, a fission device, a low-yield device, and a thermonuclear device were tested, and the "yields are in line with expected values." The tests did not result in the release of any radioactive material in the atmosphere. An Indian government press statement issued later says the tests have proven India's capability for a weaponized nuclear program and "are expected to carry Indian scientists towards a sound computer simulation capability which may be supported by sub-critical experiments if considered necessary." The Indian Government reiterates its support for an international arrangement that would prohibit underground nuclear tests (including sub-critical tests), and states that "India would be prepared to consider being an adherent to some of the undertakings in the Comprehensive Test Ban Treaty [CTBT]." The press statement indicates that CTBT consideration should "necessarily be an evolutionary process from concept to commitment and would depend on a number of reciprocal activities." India expresses its commitment to universal nuclear disarmament, and the willingness to negotiate the fissile material cut-off treaty. The government also reaffirms its adherence to stringent export controls of "sensitive technologies, equipment, and commodities."

—Official Press Release, Ministry of External Affairs, External Publicity Division, New Delhi, 11 May 1998, www.meadev.nic.in; "India Explodes Three Nuclear Devices at Pokhran," *Hindu* (Chennai), 11 May 1998, www.hinduonline.com.

10-11 May 1998

The nuclear devices are lowered into the test shafts, which are sealed in preparation for testing.

—Raj Chengappa, "The Eyes of Yama," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 427.

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10 May 1998

The three chiefs of military services are notified of the impending nuclear tests.

—Manoj Joshi, "Nuclear Shock Wave," *India Today*, 25 May 1998, www.india-today.com.

9 May 1998

Defense Minister George Fernandes is notified of the impending nuclear tests.

—Manoj Joshi, "Nuclear Shock Wave," *India Today*, 25 May 1998, www.india-today.com.

7 May 1998

Defense Minister George Fernandes speaks on the need to strengthen borders with China. Fernandes says "there will be no cut in the armed forces in those areas."

—"Fernandes Rules Out Troop Cut along Chinese Border," *Hindu* (Chennai), 8 May 1998, www.hinduonline.com.

6 May 1998

The Ministry of External Affairs (MEA) and the Prime Minister's Office (PMO) express their commitment to friendly, cooperative, and mutually beneficial relations with China.

—"Fernandes Rules Out Troop Cut Along Chinese Border," *Hindu* (Chennai), 8 May 1998, www.hinduonline.com.

5 May 1998

The Indian Army's 58 Engineers undertake measures to hide indications of the impending nuclear test at Pokhran from US reconnaissance satellites. To hide traces of activity at the site, cables connecting the test shafts are buried and camouflaged with vegetation; mounds of earth surrounding the shafts are aligned with natural wind directions; and vehicle movements are carefully controlled to avoid detection.

—Raj Chengappa, "The Eyes of Yama," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 426.

5 May 1998

The Indian government reconstitutes the Atomic Energy Commission (AEC). Dr. R. Chidambaram is retained as the commission's chairperson. Other new members include: former AEC chairman, Dr. Raja Ramanna, Principal Secretary to the Prime Minister, Mr. Brajesh Mishra, Cabinet Secretary, Prabhat Kumar, and member secretary of the Planning Commission, Professor S.R. Jashim.

—"Dr. Chidambaram Retained as AEC Chairman," Rediff on the Net, 5 May 1998, www.rediff.com.

3 May 1998

Defense Minister George Fernandes publicly declares China as India's "potential threat number one." The statement is made a week after General Fu Quanyou's visit to India. *Frontline* magazine reports that the televised interview was recorded prior the visit of the PLA's Chief of Staff but "the broadcast was delayed in response to requests from officials in the Ministry of External Affairs."

—Praveen Swami, "A Hawkish Line on China," *Frontline*, 23 May-5 June 1998, Vol. 15, No. 11, www.expressindia.com; "Congress Wants Caution on China; MEA Mum," *Indian Express*, 5 May 1998, www.expressindia.com.

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3 May 1998

According to Defense Research and Development Organization (DRDO) sources, the government has approved the second phase of Agni ballistic missile program.

—"Government Approves Second Phase of Agni Programme," *Times of India* (Mumbai), 4 May 1998, <http://timesofindia.indiatimes.com>.

1 May 1998

The six nuclear devices assigned for tests are removed from nuclear hardened underground vaults at the Bhabha Atomic Research Center (BARC) and transported by Indian Air Force AN-32 transport aircraft from Mumbai to Jaisalmer. From Jaisalmer, the devices and their plutonium cores are transported to the Pokhran test site for final assembly.

—Raj Chengappa, "The Eyes of Yama," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi).

28 April 1998

The Director of the Saha Institute of Nuclear Physics Dr. Bikash Sinha says that India does not need to worry about nuclear threats from Pakistan since the latter's program is based on "smuggled or borrowed technology" that renders its program unreliable. Emphasizing India's indigenous nuclear and missile programs, Sinha says, "We have to make sure that we have it [nuclear program], if only as a deterrent." Dr. Sinha advocates the need for total autonomy of the scientific institutions in India and accountability of the scientists.

—Wasbir Hussain, "India's Nuclear Capability Superior to Pakistan," *Asian Age* (New Delhi), 30 April 1998, www.asianageonline.com.

27 April 1998

The Chinese Army's Chief of General Staff General Fu Quanyou meets Prime Minister Atal Bihari Vajpayee and defense minister George Fernandes. The leaders stress the need for a nuclear weapons free world and the problems of the transfer of nuclear weapons, ballistic missiles, and related technologies to other countries.

—"India, China Agree to Resolve Bilateral Disputes," *Times of India* (Mumbai), 28 April 1998, <http://timesofindia.indiatimes.com>.

27 April 1998

The convener of the Bharatiya Janata Party's (BJP) Foreign Affairs Committee, N.N. Jha, states that in the event India decides to develop a nuclear arsenal, it will adopt a doctrine of "no-first-use." Jha says that India's proposed National Security Council might specifically examine the option to "induct" nuclear weapons on the basis of laboratory testing thus "circumventing" US laws, which mandate the imposition of sanctions on countries that conduct nuclear tests.

—"Jha Stresses the Principle of 'Non-First-Use of N-Weapons'," *Hindu* (Chennai), 27 April 1998, www.hinduonline.com; "India Softening World Opinion Before Pulling N-bombs Out of Basement, Charges Pakistan," Rediff on the Net, 27 April 1998, www.rediff.com.

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Late April 1998

Two separate nuclear test teams from the Bhabha Atomic Research Center (BARC) and the Defense Research and Development Organization (DRDO) begin to converge at the Pokhran nuclear test site in small groups to avoid attention. On arrival at the site, team members disguise themselves as army personnel.

—Raj Chengappa, "The Eyes of Yama," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), pp. 413-414.

20 April 1998

India's Chief of Army Staff General V.P. Malik says that strategic deterrence is necessary to counter the emerging nuclear and missile challenges. Malik stresses the need for "a clear strategic vision" for India "to exploit the emerging strategic opportunities" in the global strategic environment. India's defense minister George Fernandes says the preliminary steps to create a National Security Council have been taken. The formation of the Council will be followed by a strategic defense review. According to Fernandes, the induction of nuclear weapons will be based on the results of the strategic review.

—"Only Deterrence Can Counter Nuclear Threat," Rediff on the Net, 21 April 1998, www.rediff.com; Manoj Joshi, "Deadly Option," *India Today*, 4 May 1998, www.india-today.com; "Army Chief Calls for Steps to Counter N-Threats," *Hindu* (Chennai), 21 April 1998, www.hinduonline.com.

20 April 1998

The head of the US Nuclear Regulatory Commission Dr. Shirley Jackson visits India to renew bilateral research projects on improving the operational safety of nuclear power plants. The visit is to finalize an agreement between the United States and India (first since 1980) in three research projects dealing with fire safety in nuclear power plants, emergency procedures, and design modifications based on operating experience. The first meeting of the technical experts from both sides is scheduled for September-October 1998.

—C. Raja Mohan, "India, US to Cooperate on N-Safety," *Hindu* (Chennai), 20 April 1998, www.hinduonline.com.

15 April 1998

Prime Minister Atal Bihari Vajpayee declares that "India is not interested in any nuclear weapons race in the subcontinent but we are prepared to meet any eventuality."

—"Atal, George in Chinese Sweet-&-Sour," *Economic Times* (Mumbai), April 17 1998, www.economictimes.com; "Loose Cannon," *Asian Age* (New Delhi), 17 April 1998, www.asianageonline.com.

11 April 1998

India's Air Chief Marshal S.K. Sareen says India is seriously considering using an advanced satellite for gathering intelligence data to be used by the defense services.

—"India is Working on a Spy Satellite, Says Sareen," Rediff on the Net, 11 April 1998, www.rediff.com.

10 April 1998

The Indian government sets up a task force to formulate proposals for the constitution of a National Security Council. The task force's prominent appointees include former defense minister and task force chairman K.C. Pant, Director of the Institute of Defense Studies and Analyses, Jasjit Singh, and Planning Commission Deputy Chairman,

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Jaswant Singh.

—Rajesh Ramachandran, "Task Force Report on National Security Council in a Few Weeks," Rediff on the Net, 11 April 1998, www.rediff.com.

Early April 1998

Prime Minister Atal Bihari Vajpayee authorizes preparations for nuclear tests.

—Manoj Joshi, "Nuclear Shock Wave," *India Today*, 25 May 1998, www.india-today.com.

7 April 1998

In response to the successful test of a Pakistani surface-to-surface missile, a spokesperson of India's Ministry of External Affairs says India will do "all that is necessary" to assure the country's security.

—"India Will Take Steps to Meet Any Threat, Says MEA," Rediff on the Net, 7 April 1998, www.rediff.com.

6 April 1998

Defense Minister George Fernandes says India is capable of meeting challenges posed by Pakistan's missile program.

—"Entire Pakistan Is in Range of Prithvi: Fernandes," *Asian Age* (New Delhi), 7 April 1998, www.asianageonline.com.

6 April 1998

Pakistan tests its Ghauri medium-range ballistic missile which reportedly can deliver a 700kg payload over a range of 1,500km. A Pakistani foreign ministry spokesperson says the missile hit its "target at a range of 1,100km without any error." The spokesperson adds, "...this test represents a step forward in Pakistan's indigenous missile capability through the dedication and commitment of our scientists and engineers."

—Amit Baruah, "Pak. test-fires 1,500km-range missile," *Hindu* (Chennai), 7 April 1998, www.hinduonline.com.

5 April 1998

The Indian news agency UNI reports out that a new Indian supercomputer, PARAM 10,000, can simulate nuclear weapon explosions. [Note: The Center for Development of Advanced Computing (CDAC), Pune invented "the OpenFrame Architecture for scalable and flexible High Performance Computing unifying the well known NOW (Network of Workstations), COW (Cluster of Workstations) and MPP (Massively Parallel Processor) architectures. This architecture has been realized in C-DAC's new PARAM 10000 series supercomputers, which are scalable from the desktop to teraflop range."]

—"Indian Super Computer Can Simulate N-Bomb Tests," *Dawn* (Karachi), 6 April 1998, www.dawn.com; "Open Frame Architecture of PARAM 10000," The Center for Development of Advanced Computing, www.cdacindia.com.

2 April 1998

Defense Minister George Fernandes says foreign countries have no right to advise India on its defense policy. He also says the nuclear policy of the current government does not differ from the policies agreed upon by other political parties.

—"Centre to take up militants issue with Bhutan," *Times of India* (Mumbai), 3 April 1998, <http://timesofindia.indiatimes.com>.

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April 1998

According to *Jane's Intelligence Review*, "a prominent nuclear physicist" from India says that fission bombs are sufficient for India's security needs. The physicist admits that India has the "ingredients" to produce a thermonuclear design but "the process is very complicated" and India might need "more time to design and perfect it for testing."

—T.S. Gopi Rethinaraj, "Indian Blasts Surprise the World, but Leave Fresh Doubts," *Jane's Intelligence Review* (Coulsdon, Surrey), July 1998, pp. 19-22.

28 March 1998

The Bharatiya Janata Party (BJP) led government wins the vote of confidence in parliament with a margin of 13 votes (274-261).

—George Iype, "Vajpayee Wins Vote," Rediff on the Net, 28 March 1998, www.rediff.com.

21 March 1998

Indian defense minister George Fernandes says the government has put the decision to induct nuclear weapons "on hold." That decision will be made after a national security review has been completed by India's revived National Security Council. According to Fernandes, "We will re-evaluate the policy and to ensure security, we may, if necessary, have to exercise the [nuclear] option."

—"N-option Put on Hold: Fernandes," *Hindu* (Chennai), 19 March 1998, www.hinduonline.com.

20 March 1998

Atomic Energy Commission (AEC) Chairman R. Chidambaram calls on the newly elected Prime Minister of India Atal Bihari Vajpayee.

—Manoj Joshi, "Nuclear Shock Wave," *India Today*, 25 May 1998, www.india-today.com.

19 March 1998

Atal Bihari Vajpayee is sworn in as India's prime minister.

—C. Raja Mohan, "Foreign Policy: the BJP's Problem," *Hindu* (Chennai), 19 March 1998, www.hinduonline.com.

18 March 1998

Indian Prime Minister designate Atal Bihari Vajpayee publicly states that India will induct nuclear weapons "only if necessary." However, there is no specific time frame for induction.

—"N-weapon Induction, If Necessary," *Hindu* (Chennai), 19 March 1998, www.hinduonline.com.

March 1998

In the 12th parliamentary elections, no single political party gains a working majority. The right-wing Bharatiya Janata Party (BJP) forms a coalition government.

—Abha Dixit, "A New Foreign and Defense Policy on the Anvil," *Pioneer* (New Delhi), 18 March 1998; in FBIS Document FBIS-TAC-98-077, 18 March 1998.

1998

India receives six Il-78 flight refueling tankers from Russia.

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—W.P.S. Sidhu, "India Sees Safety in Nuclear Triad and Second Strike Potential," *Jane's Intelligence Review* (Coulson, Surrey), July 1998, p. 23.

January-February 1998

During the 12th parliamentary election campaign, the right-wing Bharatiya Janata Party (BJP) states in its election manifesto that it "rejects the notion of nuclear apartheid and will actively oppose attempts to impose a hegemonic nuclear regime by means of CTBT [Comprehensive Test Ban Treaty], FMCT [Fissile Material Cut-Off Treaty] and MTCR [Missile Technology Control Regime]," and will not accept being "dictated by anybody in matters of security requirements and in the exercise of the nuclear option." In the section on national security, the party expresses its determination to: establish a National Security Council to conduct India's "first-ever" Strategic Defense Review (SDR) "to study and analyze the security environment and make appropriate recommendations to cover all aspects of defense requirements and organization." Another objective of the SDR will be to re-evaluate India's nuclear policy, "exercise the option to induct nuclear weapons," to speed up the development of Agni ballistic missiles "with the view to increasing their range and accuracy." According to BJP sources, the word "induct" was included in the manifesto after considerable debate among the moderates and hardliners. The moderates favored more ambiguous phrasing, but the hardliners prevailed. The convener of BJP's external affairs cell Brajesh Mishra explicitly states that the BJP "will weaponize the option" and "do whatever is necessary to become a nuclear weapons power" if necessitated by India's security concerns.

—BJP Election Manifesto'98, www.bjp.org; Jyoti Malhotra, "BJP Sets Foreign Policy Agenda," *Indian Express* (Mumbai), 9 February 1998; in FBIS Document FBIS-TAC-98-040, 9 February 1998, p. 9.

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1997

1997-1998

The Center for Compositional Characterization of Materials (CCCM) in Hyderabad becomes operational. The facility, which includes an Ultra-Trace Laboratory for the purification of reagents, provides analytical services to the Department of Atomic Energy.

—Government of India, *Department of Atomic Energy Annual Report: 1997-1998*, p. 2-6.

1997-1998

The Department of Atomic Energy's (DAE) Atomic Minerals Division (AMD) discovers sizeable deposits of uranium at Lambapur-Yellapur and Tummalapalle in Andhra Pradesh.

—Government of India, *Department of Atomic Energy Annual Report: 1997-1998*, p. 2-2.

1997

The Department of Atomic Energy's (DAE) geologists discover uranium deposits, containing "up to 0.55 percent uranium oxide and small amounts of thorium oxide" in Palanad sub-basin area in Andhra Pradesh.

—"Uranium Discovered in India," *Nuclear Review*, February 1997, p. 12.

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11 December 1997

The Bharatiya Janata Party's (BJP) president L.K. Advani says that his party is "for developing a nuclear deterrent." He says that it was "wrong" for I.K. Gujral's government to "give up this option."

—"Hindu Party Says It will Make Nuclear Weapons if Voted to Power," Deutsche Presse-Agentur, 11 December 1997; in Lexis-Nexis Academic Universe, 11 December 1997, <http://web.lexis-nexis.com>.

2 December 1997

The *Hindu* reports that the second unit of Rajasthan Atomic Power Station (RAPS-II), which shut down in September 1994, is "on the way to full-scale recovery. More than 250 out of the 306 coolant channels have been replaced by a fine-tuned RAPS team. The rest of the job would be completed before the end of the month." After that the reactor will be subjected to the procedures required for the commissioning of a new reactor. "Refueling will be followed by a series of tests. Then, each system of the plant would be run separately, followed by a start-up of the reactor." Project director V.K. Chaturvedi says "safety upgradation and installation of additional infrastructure were also being undertaken simultaneously." A high pressure water injection system was installed, as AERB required. Additionally, supplementary control room, an additional on-site diesel generator to power the essential services in the event of floods, and segregation of power supply lines were installed in the reactor. According to Chaturvedi, a renovated RAPS-II can "now run for 30 more years."

—G. Pramod Kumar, "India: Rajasthan Atomic Power Station-II on Way to Full-Scale Recovery," *Hindu* (Chennai), www.hinduonline.com; in Lexis-Nexis Academic Universe, 22 October 1997, <http://web.lexis-nexis.com>.

20 November 1997

India's federal power minister Y.K. Alagh says the government is ready to look into foreign proposals for the construction of nuclear power reactors. He notes that the government will make a decision after a careful study of submitted proposals, adding that they will have to comply with the existing laws on safety, technology, environment, and inspection.

—"Plan to Allow Foreign Stake in Nuclear Power Projects," *Economic Times* (Mumbai), 20 November 1997; in FBIS Document FTS19971121000473, 20 November 1997.

19 November 1997

US Secretary of State Madeleine Albright visits India. The issue of nuclear nonproliferation is discussed during her two-hour meeting with India's Prime Minister I.K. Gujral. Albright says the United States sees India "as a major contributor to international order and it would be helpful to have New Delhi as a part of that international system." At the same time Gujral reiterates that India's nuclear program is peaceful and that the country does not engage in proliferation activities. He adds that "there has been no weaponization" of India's nuclear program.

—"India and USA Stick to 'Divergent Perceptions' on Nuclear Nonproliferation," BBC Summary of World Broadcasts, 21 November 1997; in Lexis-Nexis Academic Universe, 20 November 1997, <http://web.lexis-nexis.com>.

13 November 1997

Delivering a lecture at the National Defense College (NDC), Prime Minister I.K. Gujral says that India has no desire to manufacture nuclear weapons unless forced to do so since India cannot ignore its security concerns.

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—"Gujral: No Desire to Make Nuclear Arms unless Forced to," *Deccan Herald* (Bangalore), 14 November 1997; in FBIS Document FTS19971114000465, 14 November 1997.

12 November 1997

Nuclear Power Corporation (NPC) chairman Y.S.R. Prasad says that the two 220MW unit Kaiga nuclear power station (Karnataka) will be finished in early 1999 and be commercially operated by mid-1999. Prasad confirms that "severe problems in the containment structure had caused an extensive civil engineering review by AERB [Atomic Energy Regulatory Board], which in turn led to technical recommendations and a 30-month construction delay."

—Mark Hibbs, "NPC Vows to Finish Kaiga in 1999; Concrete Collapse Lost 30 Months," *Nucleonics Week*, 27 November 1997; in Lexis-Nexis Academic Universe, 24 December 1997, <http://web.lexis-nexis.com>.

11 November 1997

An Indian official says that the Nuclear Power Corporation (NPC) hopes to benefit from the World Association of Nuclear Operators (WANO) reviews in four main areas: "lifetime reliability of equipment and components, maintenance procedures, equipment manufacturing technology, and probabilistic safety assessments (PSA)." According to the official, the Narora-1 fire was "the most serious safety-related event" in India's nuclear program to date. He says that the event was rated at Level 2 on the IAEA International Nuclear Event Scale (INES) because "it revealed a lack of defense in-depth and because there were 'simultaneous failures of safety-related systems.'"

—Mark Hibbs, "NPC Planning on Peer Reviews at All India Stations by 2002," *Nucleonics Week*, 27 November 1997; in Lexis-Nexis Academic Universe, 24 December 1997, <http://web.lexis-nexis.com>.

2 November 1997

India's Atomic Energy Regulatory Board (AERB) chairman Dr. P. Rama Rao says that a safety research unit for India's nuclear plants will be established soon. The unit will work in association with AERB and will formulate safety protocols.

—"AERB Plans Safety Research Unit for Nuclear Plants," All India Radio Network (New Delhi), 2 November 1997; in FBIS Document FTS19971102000133, 2 November 2002.

November 1997

Nuclear Power Corporation (NPC) officials say that a World Association of Nuclear Operators (WANO) team of about 20 experts is scheduled to visit the Kakrapar Atomic Power Station (KAPS) in January 1998. They add that WANO is likely to schedule foreign peer reviews at all India's pressurized heavy water reactors (PHWR) within the next five years. Narora Atomic Power Station (NAPS) is the next on the list and will be visited in late 1998. According to the officials, India will also seek assistance in "carrying out level 1 probabilistic safety assessments for all its 220MW PHWRs, with the intention of covering grid and turbine side deficiencies such as those which led to fire at Narora-1 in 1994."

—Mark Hibbs, "NPC Vows to Finish Kaiga in 1999; Concrete Collapse Lost 30 Months," *Nucleonics Week*, 27 November 1997; in Lexis-Nexis Academic Universe, 24 December 1997, <http://web.lexis-nexis.com>.

17 October 1997

According to Indian defense ministry sources, India has developed five types of protective systems and equipment

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for its troops to safeguard against nuclear, biological, and chemical (NBC) contamination hazard. The protective systems and equipment include: NBC individual protective equipment, NBC collective protection system, NBC medical protection equipment, NBC detection equipment and NBC decontamination system. Indian sources state that these protective systems and equipment conform to stringent international standards, and their induction into service has been formally approved.

—"Protective System Developed for Safety of Troops," *Deccan Herald* (Bangalore), 18 October 1997; in FBIS Document FTS19971019000053, 18 October 1997.

16-18 October 1997

US Under Secretary of State for Political Affairs Thomas Pickering visits India to begin "the first phase" of a strategic dialogue. The issue of nuclear disarmament is discussed among a range of other issues. Indian foreign secretary K. Raghunath explains India's nuclear posture "in terms of its broader security needs," while Pickering lays out US concerns about nonproliferation and stability.

—C. Raja Mohan, "India, US Begin Process of Strategic Dialogue," *Hindu* (Chennai), 18 October 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 22 October 1997; C. Raja Mohan, "India, US Agree on Need to Combat Terrorism," *Hindu* (Chennai), 19 October 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 22 October 1997, <http://web.lexis-nexis.com>; "Bid to Boost Indo-US Ties 'Still a Long Way to Go': US Official," *Agence France Presse*, 18 October 1997; in Lexis-Nexis Academic Universe, 18 October 1997, <http://web.lexis-nexis.com>.

12 October 1997

Replying to Dr. Ramanna's statement that 1974 explosion was a nuclear bomb, former Atomic Energy Commission (AEC) Chairman Dr. Homi Sethna tells *Asian Age* that the nuclear device tested at the time was "for peaceful purposes." Sethna adds that in order to be called a bomb, a device has to be of a particular shape and be portable, which was not the case with the device tested in 1974.

—Mini Pant Zachariah, "Indian Scientist Says Ramanna Wrong about 1974 'Bomb'," *Asian Age* (New Delhi), 12 October 1997; in FBIS Document FTS19971013001273, 12 October 1997.

10 October 1997

Raja Ramanna, a leading scientist in India's 1974 nuclear explosion, says the 1974 test provided Indian scientists with the information that could be used to make a nuclear bomb. He adds that a label of "peaceful" explosion came from the political side.

—"Indian Scientist Rejects 'Peaceful' Nuclear Test Claim," *Hong Kong AFP*, 10 October 1997; in FBIS Document FTS19971010000316, 10 October 1997.

4 October 1997

Speaking at the 40th anniversary of the International Atomic Energy Agency (IAEA), Atomic Energy Commission (AEC) Chairman, R. Chidambaram says that India maintains its record of "never having transferred any nuclear technology or material to any country which has then misused it." He adds that under its export control regime India "lists items sensitive in nature in one of the three categories - a negative list of prohibited items, prescribes substances and equipment list for items canalized for export through specific organization, and special materials

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equipment and technology (SMET) list." Chidambaram further remarks that performance of India's nuclear power plants has improved considerably, with the capacity factor of the newer generation plants comparable to international standards.

—"Report: World Invited to Invest in Indian Nuclear Plants," *Financial Express* (Mumbai), 5 October 1997; in FBIS Document FTS19971005000822, 5 October 1997.

Late September 1997

The Indian government agrees to allocate approximately 5.15 billion rupees for the fast breeder reactor (FBR) project. The reactor's commissioning is expected in 2009.

—Neel Patri, "Indian Government Funds DAE Plan to Build 500-MW Fast Breeder Reactor," *Nucleonics Week*, 2 October 1997; in Lexis-Nexis Academic Universe, 30 October 1997, <http://web.lexis-nexis.com>.

24 September 1997

In an address to the 52nd session of the United Nations General Assembly, Prime Minister I.K. Gujral says that "the global community has lived for too long on a diet of empty promises. The pretexts for clinging to nuclear arsenals, which were questionable at any time, have now vanished. Mere nonproliferation treaties, promoted as disarmament measures, only serve to entrench a nuclear monopoly. No credible steps towards striving to realize a nuclear weapon free world are contemplated, much less taken, by those who should be showing the way. No justifications can be preferred as during the Cold War. The patience of the world community, expressed through the International Court of Justice,...is starting to wear thin. Nuclear weapon powers owe it to the world to answer the question why they need nuclear weapon." He appeals to the nuclear weapon states "to align their policies to what the world wants." According to Gujral, the United Nations should function as a "forum, in which the international community must continue to demand universal nuclear disarmament."

—I.K. Gujral, Address to the 52nd Session of the UN General Assembly, 24 September 1997, Ministry of External Affairs, Government of India, www.meadev.nic.in.

23 September 1997

At a dinner hosted by the Asia Society in New York, Prime Minister I.K. Gujral says that creation of a nuclear weapon free world is an essential part of India's vision. He adds that India hopes it will be achieved "in the 21 century, if not earlier." According to Gujral, beliefs that India has a "nuclear bomb in the basement" are based on misperception and prejudice. He summarizes the history of India's commitment to nuclear disarmament, emphasizing its restraint after the peaceful nuclear explosion of 1974 and its commitment to keep the nuclear option until the world around India is made nuclear weapon free. According to Gujral, India did not sign the NPT "because of its inherent flaws" but has observed the treaty's provisions by not "help[ing] the process of proliferation" either openly or in a clandestine manner. He adds that India had "no option" but to decline the Comprehensive Test Ban Treaty (CTBT) when its proposal to include a pledge by the nuclear weapon states to eliminate their nuclear arsenals within a reasonable timeframe was not included in the draft.

—I.K. Gujral, "India-50 Years on: Promise for the Next Millennium," Speech at a dinner hosted by the Asia Society, New York, 23 September 1997, Ministry of External Affairs, Government of India, <http://www.meadev.nic.in>.

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22 September 1997

During a private meeting in New York, US President Bill Clinton urges Prime Minister Gujral not to take any hasty decision on the resumption of nuclear testing. Clinton also proposes that India and the United States enter into a 'strategic dialogue' on the nuclear issue.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 408.

21 September 1997

The Indian government clarifies that opening up India's nuclear reactors for inspections by the World Association of Nuclear Operators (WANO) does not indicate a policy shift and will not entail the imposition of International Atomic Energy Agency (IAEA) safeguards. The inspections will be carried out by WANO technicians to ensure safety of India's nuclear installations.

—"Sources-No 'Policy Shift' on Nuclear Plants Inspection," All India Radio Network, 21 September 1997; in FBIS Document FTS19970921000143, 21 September 1997.

19 September 1997

The Bharatiya Janata Party's (BJP) General Secretary Pramod Mahajan says his party strongly condemns the decision of Gujral government to open India's nuclear reactors for public scrutiny. He says this "highly disturbing decision" endangers India's security.

—"BJP Opposed to Foreign Inspection of Nuclear Reactors," *Deccan Herald* (Bangalore), 20 September 1997; in FBIS Document FTS19970920000341, 20 September 1997.

18 September 1997

Speaking about the decision to open India's nuclear installations to international inspections, India's Prime Minister I.K. Gujral says the decision is "an ongoing process and a routine one, blown up by the media." India's Congress party, whose support is vital for the survival of Gujral's 13-party United Front (UF) coalition government, and the Bharatiya Janata Party (BJP) oppose the decision as one that is "fracturing the existing national consensus on keeping the nation's nuclear establishment closed to foreign examination." Congress representative Prithviraj Chavan says the government should have consulted other political parties before embarking on this "policy shift." BJP's Murli Manohar Joshi says India's nuclear reactors are "not only for power generation, but [also have] a bearing on the country's economic and defense activities."

—"Gujral Defends Plan to Open Two Nuclear Plants for Inspection," Deutsche Presse-Agentur, 18 September 1997; in Lexis-Nexis Academic Universe, 18 September 1997, <http://web.lexis-nexis.com>; John Zubrzycki, "Nuclear Revelations Come Under Fire," *South China Morning Post* (Hong Kong), 19 September 1997; in Lexis-Nexis Academic Universe, 20 September 1997, <http://web.lexis-nexis.com>.

17 September 1997

According to the Indira Gandhi Center for Atomic Research (IGCAR) director Placid Rodriguez, the Kalpakkam Mini Reactor (Kamini), the Uranium-233 fuelled reactor, attains its maximum capacity of 30KW at IGCAR today.

—"India: Kamini Attains Maximum Capacity," *Hindu* (Chennai), 18 September 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 23 September 1997, <http://web.lexis-nexis.com>.

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16 September 1997

Press Trust of India reports that India has decided to open its nuclear installations for international inspections. The Kakrapar nuclear power station in Gujarat will be subjected to a peer review by the members of the Tokyo-based World Association of Nuclear Operators (WANO) during their visit to India in November. India also intends to subject its 500MW pressurized heavy water reactor designs proposed for Tarapur to a peer review. According to the Nuclear Power Corporation's (NPC) Y.S. Prasad, "opening the plants or subjecting the design for peer review has nothing to do with the IAEA [International Atomic Energy Agency] convention on safety of nuclear plants which India signed but has not ratified... What we are doing is voluntary and is a confidence-building measure... We know our nuclear plants are good but let the world nuclear community find out themselves how safe they are and how well they run."

—"India to Open Two Nuclear Plants for Inspection," Deutsche Presse-Agentur, 16 September 1997; in Lexis-Nexis Academic Universe, 17 September 1997, <http://web.lexis-nexis.com>;"India Opens Doors for Nuclear Inspection," Xinhua General Overseas News Service, 17 September 1997; in Lexis-Nexis Academic Universe, 18 September 1997, <http://web.lexis-nexis.com>; John Zubrzycki, "Nuclear Revelations Come Under Fire," *South China Morning Post*, 19 September 1997; in Lexis-Nexis Academic Universe, 20 September 1997, <http://web.lexis-nexis.com>; Neel Patri, "India Invites First WANO Review of Its PHWRs at Kakrapar," *Nucleonics Week*, 2 October 1997; in Lexis-Nexis Academic Universe, 30 October 1997, <http://web.lexis-nexis.com>.

10 September 1997

The head of Russian Atomic Energy Ministry Victor Mikhailov says the procedure for India's reimbursement for a Russian loan to construct two VVER-1000 light-water reactors in Koodankulam will be worked out by the year end. Thereafter, preparation for project implementation will commence. According to Mikhailov, the latter can be done in 1998.

—"Russian Minister Discusses Nuclear Cooperation in India," Interfax (Moscow), 10 September 1997; in FBIS Document FTS199709100000476, 10 September 1997.

10 September 1997

Asia Pulse News Agency reports that India's Nuclear Power Corporation (NPC) "has posted a net profit of 2.52 billion rupees during 1996-97, an increase of 67 percent over the previous year, when it posted a net profit of 1.51 billion rupees."

—"India's Nuclear Power Corp Posts 67 PCT Profit Rise," Asia Pulse, 10 September 1997; in Lexis-Nexis Academic Universe, 10 September 1997, <http://web.lexis-nexis.com>.

8 September 1997

At a two-day international seminar on the role of nuclear energy for sustainable development in New Delhi, India's Prime Minister I.K. Gujral says India's nuclear program "continues to be peaceful and is not for nuclear weapons. India has the capacity to make nuclear weapons but it does not want them. The only test which it has done has been left far behind." He adds, however, that India will keep its nuclear option open to meet the "unforeseen circumstances." Gujral notes that India is interested in cooperation in the areas of nuclear safety and nuclear waste management. Atomic Energy (AEC) chairman R. Chidambaram says India is looking at importing light water reactors to reach its consensus target of 20,000 MW of nuclear energy by 2020. Deputy Chairman of the Planning

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Commission Madhu Dandavate says that while India's self-reliance in the nuclear field is a matter of pride and satisfaction, though he would like the seminar to explore financial possibilities under the aegis of the International Atomic Energy Agency (IAEA). Talking to the press after inaugurating the seminar, IAEA chief Hans Blix says that "apart from finance, the single major hurdle for India to develop its nuclear power program is its non-adherence to the Nuclear Nonproliferation Treaty." He adds, however, that India can go ahead with its deal with Russia to construct the two VVER-1,000 reactors at Koodankulam since the agreement was reached before Russia became a party to the nuclear suppliers group. Speaking of the deal, Russian Minister of Atomic Energy Victor Mikhailov says no agreement on "mutually acceptable financial terms" has been reached yet. He says Russia wants India to pay 75 percent of the credit in US dollars in less than 15 years, with the rest to be covered through a barter arrangement. —"India Barred from Buying Nuclear Power Plants in the World Market," Deutsche Presse-Agentur, 8 September 1997; in Lexis-Nexis Academic Universe, 9 September 1997, <http://web.lexis-nexis.com>; "India Will Keep N-Option Open, Says Gujral," *Hindu* (Chennai), 9 September 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 11 September 1997, <http://web.lexis-nexis.com>; "India Will Not Make Nuclear Bomb but Keeps Option Open," Agence France Presse, 8 September 1997; in Lexis-Nexis Academic Universe, 8 September 1997, <http://web.lexis-nexis.com>; "India No Longer Seeking Self-Reliance in Atomic Energy," Bernama, the Malaysian National News, 9 September 1997; in Lexis-Nexis Academic Universe, 11 September 1997, <http://web.lexis-nexis.com>.

2-7 September 1997

US Assistant Secretary of State for South Asia Karl F. Inderfurth pays a five-day visit to India. In an interview to *India Today* he says that the United States "wants to see India join the CTBT [Comprehensive Test Ban Treaty]." He adds that the US government "fully recognizes that India has sovereign right to determine its own national security requirements. But we believe that those requirements can be best met through the elimination of any further nuclear testing by any party."

—Manoj Joshi, Sudeep Chakravarti, and Tania Anand, "Indo-US Relations: Uncle Sam's Agenda," *India Today*, 29 September 1997, www.india-today.com; in Lexis-Nexis Academic Universe, 9 December 1997, <http://web.lexis-nexis.com>.

5 September 1997

The International Atomic Energy Agency (IAEA) adopts the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management by a vote of 64-2, with three abstentions. China, Russia, and India choose not to voluntarily include reprocessing in the activities they will submit for a review under the treaty. India's delegate Krishnamurti Balu says that India "would have preferred that spent fuel was excluded, or included as a protocol... but [it] can live with it as things are."

—Gamini Seneviratne, "Radwaste Safety Convention Signing Ready for IAEA General Conference," *Nucleonics Week*, 18 September 1997; in Lexis-Nexis Academic Universe, 16 October 1997, <http://web.lexis-nexis.com>.

1-5 September 1997

During a debate on the proposed Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management at the International Atomic Energy Agency (IAEA) in Vienna, India, which fiercely objects to combining spent fuel and radioactive waste in one treaty, suggests redrafting a key article of the agreement to explicitly exclude spent fuel, meant for reprocessing, from the convention's scope.

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—Gamini Seneviratne, "Three Amendments Proposed at Radwaste Treaty Talks," *Nucleonics Week*, 4 September 1997; in Lexis-Nexis Academic Universe, 2 October 1997, <http://web.lexis-nexis.com>.

28 August 1997

During a debate in the Lok Sabha (India's lower house of parliament), Defense Minister Mulayam Singh Yadav says India will not sign the Comprehensive Test Ban Treaty (CTBT) until the five nuclear weapon states destroy their arsenals. He adds that India will not forsake its nuclear option "until the five bullies dump their nuclear weapons in the sea."

—"India's Foreign Policy Endorsed," *Hindu* (Chennai), 29 August 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 5 September 1997, <http://web.lexis-nexis.com>; "Defense Minister Reasserts India will not Sign Comprehensive Test Ban Treaty," BBC News Summary of World Broadcasts, 29 August 1997; in Lexis-Nexis Academic Universe, 28 August 1997, <http://web.lexis-nexis.com>; "India will not Make Nuclear Bomb but Keeps Option Open," Agence France Presse, 8 September 1997; in Lexis-Nexis Academic Universe, 8 September 1997, <http://web.lexis-nexis.com>.

7 August 1997

Speaking in parliament, India's Prime Minister I.K. Gujral says India is "not going to be deterred in following [its] nuclear policy whether there is pressure, direct or indirect." Referring to an Indo-Russian deal on the construction of two VVER-1,000 reactors in Koodankulam, he notes that "some countries are not positive towards India getting nuclear power technology [from Russia] and [are] coming in our way."

—Harbaksh Singh Nanda, "India Will Not Abandon Nuclear Program," United Press International, 7 August 1997; in Lexis-Nexis Academic Universe, 8 August 1997, <http://web.lexis-nexis.com>; "Gujral Firm on N-Program, ISI Activities Cannot Be Ignored," *Statesman* (Calcutta), 7 August 1997, www.thestatesman.net; in Lexis-Nexis Academic Universe, 12 July 1997, <http://web.lexis-nexis.com>.

1 August 1997

Y.S.R. Prasad, a Managing Director of the Nuclear Power Corporation (NPC), says that India's current nuclear energy capacity is 1,840MW, "with most plants operating at high capacity factors (plant load factor)." He adds that a minimum of 880MW should be added by the end of Ninth Plan, taking the overall capacity to 2,720MW by 2002. According to Prasad, "the most practical step to improve [power] generation in the nuclear sector is through the higher allocation of funds from the government; [otherwise] the nuclear program will continue to suffer in India." Prasad notes that projected energy requirements for India require adding at least 10,000 MW each year in the Ninth Plan while the private sector can fund a 1,000 MW project "at the most." He says that while Indian "industry and institutions have augmented facilities to design and manufacture all the equipment necessary for the safe operation of power plants,...there have not been any proposals for equity participation in the actual setting up of a power plant." Prasad does not see the possibilities for significant equity participation of large foreign companies "in the prevailing environment with five nuclear supplying countries and technology control regimes targeting India." Speaking of the Indo-Russian deal on the construction of two VVER-1,000 reactors in Koodankulam, Prasad says that Russia will supply the materials, as well as extend a long-term loan for the 60 percent of the project funds.

—Somasekhar Mulugu, "Needed More Government Funds - Mr. Y.S.R. Prasad, MD, Nuclear Power Corporation of

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India," *Business Line* (New Delhi), 1 August 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 13 August 1997, <http://web.lexis-nexis.com>.

1 August 1997

In an interview to *Business Line* (New Delhi), Bhabha Atomic Research Center's (BARC) director Anil Kakodkar says that BARC is working on the development of an Advanced Heavy Water Reactor (AHWR), which will use 75 percent of thorium and 25 percent of plutonium as a fuel. He says, however, that the use of thorium on a commercial basis will commence only around 2040. Among the advantages of AHWR design Kakodkar lists an automatic reactor shut-off in case of any problem and the gestation period for construction less than 72 months. He adds that "greater reliability is assured as the fuel will be indigenously made using [India's] vast thorium resources and easily available items would be used" in reactor construction. Among BARC's focus areas for the Ninth Plan, Kakodkar mentions "mastering thorium route, which has special problems such as high gamma radiation," strengthening expertise gained in fast breeder reactors, and setting up a facility "for proving the physics of [AHW] reactor design. According to Kakodkar, the BARC has "real problems" with "technology hurdles" since no technology is available from "developed nations in the nuclear arena" and the scientists have to start from scratch. Kakodkar points out that India is "one of the few countries" that have their own fuel reprocessing facilities. On safety and waste immobilization issues he mentions that India has waste immobilization plants at Trombay, Tarapur and Kalpakkam. "These facilities would have large glass canisters to seal the nuclear wastes for long periods. Low and intermediate level radiations in nuclear power plants are handled in waste management facilities in power plants themselves," he adds.

—Somasekhar Mulugu, "India Nuclear Energy: We Have to Master the Thorium Route," *Business Line* (New Delhi), 1 August 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 13 August 1997, <http://web.lexis-nexis.com>.

August 1997

India agrees to subject its new Gujarat-based 500MW nuclear reactor designs to a review by safety experts at the International Atomic Energy Agency (IAEA).

—"India to Open Two Nuclear Plants for Inspection," *Deutsche Presse-Agentur*, 16 September 1997; in Lexis-Nexis Academic Universe, 17 September 1997, <http://web.lexis-nexis.com>; "India Opens Doors for Nuclear Inspection," *Xinhua General Overseas News Service*, 17 September 1997; in Lexis-Nexis Academic Universe, 18 September 1997, <http://web.lexis-nexis.com>.

31 July 1997

Addressing the Rajya Sabha (upper house of parliament), Prime Minister I.K. Gujral says that "any Fissile Material Cut-Off Treaty (FMCT) can be a useful and necessary step but as part and parcel of a negotiated, phased program for the elimination of nuclear weapons." Gujral reassures parliament that his government "remains committed to safeguarding the country's security."

—"Rajya Sabha Informed of Delhi's Nuclear Disarmament Policy," *Deccan Herald* (Bangalore), 1 August 1997; in FBIS Document FTS19970801000464, 1 August 1997.

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25 July 1997

In an address in Mumbai on the prerequisites for the introduction and growth of nuclear power in developing countries, the chief of the International Atomic Energy Agency's (IAEA) nuclear power engineering section Boris Gueorguiev says that India's "unique achievement in successful development of a comprehensive and self-reliant nuclear power program" should be shared with other countries. He adds that the IAEA considers the Department of Atomic Energy (DAE) as "one of the major centers for human resource development for the nuclear power industry especially in developing countries."

—"India Can Be a Role Model in Nuclear Power Plants: IAEA Official," Deutsche Press-Agentur, 25 July 1997; in Lexis-Nexis Academic Universe, 25 July 1997, <http://web.lexis-nexis.com>.

19 July 1997

India's Ministry of External Affairs expresses serious concern over an amendment to the US Foreign Assistance Act of 1961, which lifts some restrictions on military and economic aid to Pakistan. A ministry statement says that Indian government will take all necessary measures to safeguard India's security.

—"Concern Expressed over US Lifting Restrictions on Pakistan," *Hindustan Times* (New Delhi), 19 July 1997; in FBIS Document FTS19970719000407, 19 July 1997.

17 July 1997

In an interview to *Business Line*, Atomic Energy Commission (AEC) Chairman R. Chidambaram says that there is no slowdown in India's nuclear program "as far as technology development is concerned." He adds that the power generation fell behind schedule due to "the paucity of funds" available for the nuclear power sector. According to Chidambaram, two 500MW units at Tarapur, Kaiga-3 and -4, as well as the Prototype Fast Breeder Reactor (PFBR), which have already been approved by the government, will help to accelerate the power program. Chidambaram says he believes in a "strong and independent regulatory system" and asserts that the Department of Atomic Energy (DAE) does not interfere with the actions of the Atomic Energy Regulatory Board (AERB). He adds that in a regulatory system that is evolving in India, "it is essential that both the AERB and the DAE work together."

Chidambaram points to a "healthy cooperation" with the Indian industry, particularly Bharat Heavy Electricals Limited (BHEL), Larsen and Toubro (L&T), Walchandnagar Industries, and small private sector units in Hyderabad and Bangalore. He mentions the creation of the Indian Atomic Industrial Forum (IAIF) at the end of 1996 "to increase the interaction with domestic industry." Speaking of the commercial opportunities at the international market, Chidambaram says "it would take some time" before India can take a full advantage of them. He notes, however, that a first step was already made when the DAE exported heavy water to South Korea and the Nuclear Fuels Corporation (NFC) exported zirconium to the United States and South Korea.

—Somasekhar Mulugu, "India: We Expect the N-Power Programme to Accelerate: Dr. R.Chidambaram, Secretary, Department of Atomic Energy," *Business Line* (New Delhi), 17 July 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 21 July 1997, <http://web.lexis-nexis.com>.

16 July 1997

Addressing the issue of US export restrictions on Indian entities for their involvement in the country's nuclear and missile programs, India's defense minister Mulayam Singh Yadav says it is a "blessing in disguise." He argues that the restrictions will "give a boost to the nations' self-reliance efforts."

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—"Defense Minister 'Belittles' US Ban on Indian Firms," Doordarshan Television Network (New Delhi), 16 July 1997; in FBIS Document FTS19970717000152, 16 July 1997; "More on Minister's Remarks on US Export Curbs on Companies," *Deccan Herald* (Bangalore), 17 July 1997; in FBIS Document FTS199707170001574, 17 July 1997.

13 July 1997

In an interview to the Press Trust of India (PTI), India's Prime Minister I.K. Gujral says that India's nuclear options are open "till the world moves towards abolition of nuclear weapons on a programmatic basis and not rhetorically." He describes the Comprehensive Test Ban Treaty (CTBT) as a "charade" since "it is neither comprehensive nor does it ban the tests." Gujral asserts that the Agni missile program has not been shelved. He also says that India will not be a party to the Fissile Material Cut-Off Treaty (FMCT).

—"PM Rules Out 'Tinkering' with Laws on Judges Appointment," *Statesman* (Calcutta), 13 July 1997, www.thestatesman.net; in Lexis-Nexis Academic Universe, 18 July 1997, <http://web.lexis-nexis.com>; "Premier Interviewed on Relations with Pakistan, Security Issues," BBC, 15 July 1997; in Lexis-Nexis Academic Universe, 14 July 1997, <http://web.lexis-nexis.com>.

9 July 1997

India's Prime Minister I.K. Gujral says India's opposition to the Comprehensive Test Ban Treaty (CTBT) has been vindicated by the recent sub-critical nuclear test, carried out by the United States. At the same time, he says, India is ready to sign a nondiscriminatory nuclear test ban treaty.

—"Gujral Says US Nuclear Test Vindicates Stand on CTBT," All India Radio Network, 9 July 1997; in FBIS Document FTS19970709000009, 9 July 1997.

5 July 1997

In a press release, India's Ministry of External Affairs regrets the sub-critical nuclear test, conducted by the United States recently, and expresses concern over Washington's stand that the activity is permitted under the Comprehensive Test Ban Treaty (CTBT). The press release expresses regret that the CTBT contains the loopholes that allow some countries to continue nuclear tests.

—"Serious Reservations Expressed over US Nuclear Test," All India Radio Network (New Delhi), 5 July 1997; in FBIS Document FTS19970705000358, 5 July 1997.

Early July 1997

The Fast Breeder Test Reactor (FBTR) at the Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam is synchronized to the Tamil Nadu grid. IGCAR scientists test an indigenously developed plutonium-uranium mixed carbide fuel in the core of the FBTR, producing "up to 10.5MW of power in trial runs." According to IGCAR Director Dr. Placid Rodriguez, the fuel "has been trial run for a burn-up of 32,000MW days per ton with faultless performance." The plutonium-uranium ratio in this fuel is 70:30. The fuel was developed as an alternative for enriched uranium-based fuel.

—Somasekhar Mulugu, "India Nuclear Scientists Develop Driver Fuel," *Business Line* (New Delhi), 15 July 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 18 July 1997, <http://web.lexis-nexis.com>; Somasekhar Mulugu, "Fast Breeder Reactor: A Fillip to India's Nuclear Program," *Business Line* (New Delhi), 18 July 1997, www.hinduonline.com; in Lexis-Nexis Academic Universe, 22 July 1997, <http://web.lexis-nexis.com>.

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July 1997

Prime Minister Gujral authorizes the digging of a sixth shaft at the Pokhran nuclear test site in preparations for nuclear tests in the future.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 405.

29 June 1997

In a televised interview, India's Prime Minister I.K. Gujral says that India will not surrender its "deterrent security options" but at the same time will strive for peace.

—"Gujral to Retain 'Deterrent Security Options'," AFP (Hong Kong), 29 June 1997; in FBIS Document FTS19970629000465, 29 June 1997.

11 June 1997

Speaking at a conference on nuclear nonproliferation in Washington, DC, India's permanent representative to the United Nations, Mr. Prakash Shah says that New Delhi is convinced that total nuclear disarmament in a time-bound framework is the only way to solve the problem of nuclear proliferation.

—"Signing of CTBT in 'Present Form' Ruled Out," All India Radio Network (New Delhi), 11 June 1997; in FBIS Document FTS19970611000256, 11 June 1997.

31 May 1997

Addressing Indian scientists at the Bhabha Atomic Research Center (BARC), Prime Minister I.K. Gujral says India will not sign the proposed Fissile Material Cut-Off Treaty (FMCT). Gujral asserts that India's nuclear options will not be compromised under any circumstances because national security is of primary importance.

—"Gujral Rules Out Signing Fissile Material Control Regime," All India Radio Network (New Delhi), 31 May 1997; in FBIS Document FTS199706010000044, 31 May 1997; "Report Details Gujral's Statement on Nuclear Issue," *Deccan Herald* (Bangalore), 1 June 1997; in FBIS Document FTS19970602000302, 1 June 1997.

21 May 1997

The *Pioneer* reports that India's nuclear submarine project is "on the verge of a critical breakthrough with the Prototype Testing Center (PTC) at Kalpakkam getting ready for trials." The PTC, located within the Indira Gandhi Center for Atomic Research (IGCAR), will be used to test the submarine's turbines and propellers. The report also notes that a similar testing facility is operational at Vishakhapatnam "to test the main turbines and gear box" of the projected Indian nuclear submarine, codenamed the Advance Technology Vessel (ATV).

—Wilson John, "Secret Nuclear Submarine Reaches Vital Stage," *Pioneer* (New Delhi), 21 May 1997; in FBIS Document FTS19970521002136, 21 May 1997.

Mid-May 1997

India's new Prime Minister I.K. Gujral meets his Pakistani counterpart Nawaz Sharif during the South Asia Association of Regional Countries (SAARC) summit at Maldives. The two agree to establish a hot line between the prime ministers in addition to the existing military hotline.

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—Tim Healy and Arjuna Ranawana, "A Clean Slate," *Asiaweek*, 23 May 1997; in Lexis-Nexis Academic Universe, 21 May 1997, <http://web.lexis-nexis.com>.

7 May 1997

The Minister of State for Science and Technology Mr. Yogendra Alagh tells *Lok Sabha* (India's lower house of parliament) that the government is open to specific offers for private sector participation in nuclear power generation. According to Alagh, the offers will be considered based on technical suitability, economic attractiveness, and conditions attached to it. He says amendments to the Atomic Energy Act of 1962 will be considered to facilitate this.

—"Government to Allow Private Sector in Nuclear Power Field," All India Radio Network (New Delhi), 7 May 1997; in FBIS Document FTS19970507000280, 7 May 1997.

April 1997

Tamil Nadu state government requests the federal government in New Delhi to reconsider the proposal for a nuclear power plant, to be constructed with Russian assistance at Koodankulam. Indian ecologists are concerned that, given the instances of leakages and malfunctioning of the nuclear power plants in India and other countries, the people of Tirunelveli district of Tamil Nadu "will have to face the prospect of indiscernible radiation hazards and genetic disorders of future generations too." Fishermen of the district staged protests, stating that their livelihood will be jeopardized since the fish will be affected if the coolant water from the plant is discharged into the sea.

—R. Parthasarathy, "Koodankulam: Experts Express Concern," *Hindu* (Chennai), 7 April 1997, www.hinduonline.com.

29 April 1997

Atomic Energy Commission (AEC) Chairman R. Chidambaram says negotiations with Russia on the construction of an additional 2,000MW nuclear power plant are under way. According to Chidambaram, a detailed project report is in the process of preparation.

—"Negotiations Under Way With Russia for Nuclear Power Plant," All India Radio Network (New Delhi), 29 April 1997; in FBIS Document FTS19970429000080, 29 April 1997.

24 April 1997

An Indian parliamentary panel asks the Department of Atomic Energy (DAE) to clarify whether unit one of Kaiga Atomic Power Station (KAPS) has received approval from the Atomic Energy Regulatory Board (AERB). According to the parliamentary standing committee on energy, a report recently submitted by DAE did not mention clearly whether the new design for Kaiga-1 was approved by the AERB. The committee urges DAE to provide the information on the progress of all units periodically. The committee expresses concern over the DAE's inability to utilize all the budgeted funds during the Eighth Plan period.

—"India: DAE Asked to Clarify AERB Approval for Kaiga Nuclear Plant," *Deccan Herald* (Bangalore), www.deccanherald.com.

23 April 1997

I.K. Gujral wins vote of confidence in Lok Sabha (lower house of parliament) and succeeds Deve Gowda as prime

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minister.

—"India's New PM Gujral Wins Vote of Confidence," *Asia Pulse*, 23 April 1997; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>, 23 April 1997.

22 April 1997

Speaking to the *Deccan Herald*, the director of Kaiga Atomic Power Station (KAPS) V.K. Sharma says Kaiga's two 220MW reactors may be commissioned during 1998-99. According to Sharma, the reactors' estimated cost will amount to 22.75 billion rupees (up from the original estimate of 7.74 billion rupees). He ascribes this cost hike to the collapse of the dome in one of the reactors three years ago, the Indian rupee's devaluation and price escalation. According to Sharma, the reactor dome collapsed due to its "inability to withstand tension generated by pre-stressing of cables, which were inadequately grouted." Sharma admits weak and faulty design and indicates that new specifications such as "increasing the dome thickness by 110mm and changing the concrete grade from M45 to M60" had been incorporated. He says that the two units were initially scheduled for completion in June 1996 and the interest burden of 1.5 billion rupees is to be paid due to the delay. Sharma reiterates that nuclear power is "benign and ecologically safe." He says the Kaiga plant is designed to withstand natural calamities like cyclones, seismic tremors and flooding. He also notes that the plant allows for double containment of radioactive leakage and has a 3.2 km exclusion zone, which exceeds globally adopted limits.

—"India: Commissioning of Kaiga Nuclear Plant Reactors in 1998-99," *Deccan Herald* (Bangalore), 23 April 1997, www.deccanherald.com; in FBIS Document FBIS-NES-97-113, 23 April 1997.

11 April 1997

The Indian Army's 58 Engineers completes task of sinking two additional shafts for future nuclear tests.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 404.

Early April 1997

The annual report of defense ministry states that China's progress in modernizing its nuclear arsenal and its reported assistance to Pakistan will continue to determine India's security concerns. According to the report, India is developing an indigenous missile capability in response to the evolving security environment in the region. The report reiterates India's refusal to sign the Comprehensive Test Ban Treaty (CTBT) and states that the treaty is neither a measure for nuclear disarmament nor is it comprehensive. The release of the report coincides with the first meeting in more than three years between the foreign ministers of India and Pakistan.

—John Zubrzycki, "Nuclear Options 'Must Be Kept Open' due to Regional Situation," *South China Morning Post* (Hong Kong), 11 April 1997, p. 2.

2 April 1997

India's Nuclear Power Corporation (NPC) issues a statement, indicating a net profit of 2.9 billion rupees in 1996-97, compared to 1.52 billion rupees in 1995-96. According to the statement, this was possible due to "a major jump in productivity and efficient utilization of resources at all its eight operating power stations." The statement says the NPC generated 9,087 million units (MUs) of power against the targeted 7,570 MUs for 1996-97. According to NPC Managing Director Y.S.R. Prasad, NPC's performance over last several years "amply demonstrated that nuclear

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power technology in the country had attained a mature status."

—"India's Nuclear Power Corp Posts 250 PCT Rise in Profit," *Asia Pulse*, 3 April 1997; in Lexis-Nexis Academic Universe, 3 April 1997, <http://web.lexis-nexis.com>; "Report Notes Steps to Boost Nuclear Power Generation," *Economic Times* (Mumbai), 19 February 1997; in FBIS Document FTS19970219999469, 19 February 1997.

1 April 1997

The Indian Army's 58 Engineers begin preparing additional nuclear test shafts. To disguise their activity from overhead reconnaissance satellites, the engineers make use of abandoned wells, avoid erecting fences around the shaft sites, and purposely amplify activity signatures to add to the confusion.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), pp. 403-404.

31 March 1997

Unit 1 of the Rajasthan Atomic Power Station (RAPS) resumes commercial operations.

—Government of India, *Department of Atomic Energy Annual Report: 1997-1998*, p. 2-1.

24-26 March 1997

During Indian Prime Minister H.D. Deve Gowda's visit to Russia, India and Russia agree to revive the VVER-1,000 light water reactors' deal. The two sides agree to speed up early completion of the detailed project report on the deal. Russia dismisses US protests regarding the deal, stating it does not violate the 1992 agreement of the Nuclear Suppliers Group (NSG). According to India's Minister of External Affairs I.K. Gujral, the detailed project report on reactor construction will "[take] some time" but the two countries have agreed to proceed with the deal.

—Dadan Upadhyay, "Russia Agrees to Sell N-Reactors to India," *Indian Express* (Mumbai), 26 March 1996, www.expressindia.com; "India to Acquire Nuclear Plants from Russia," *Indolink* (San Ramon, California), www.indolink.com; "Delegations Sign Agreements on Trade, Nuclear Power Plants," *ITAR-TASS*, 25 March 1997; in FBIS Document FTS19970325003131, 25 March 1997; "Report Notes 'Delay' in Signing Nuclear Plant Agreement," *Deccan Herald* (Bangalore), 26 March 1997; in FBIS Document FTS19970326000180, 26 March 1997.

23 March 1997

India decides to ask Russia to prepare a detailed project report for the proposed construction of two VVER-1,000 light water reactors at Koodankulam (Tamil Nadu).

—K.K. Katyal, "India to Press Russia for Report on Nuclear Plant," *Hindu* (Chennai), 24 March 1997, www.hinduonline.com.

22-23 March 1997

At a seminar on "containment migration in deep groundwater" held at the Bhabha Atomic Research Center (BARC), Australian Nuclear Science and Technology Organization (ASNTO) offers to assist BARC scientists to identify a site for geological disposal of high-level radioactive waste (HLW) using accelerator mass spectrometry (AMS) technology. At the seminar, AMS is identified as the most accurate technology to determine a site for geological storing of HLW.

—"India: Australia to Help with Nuclear Waste Disposal Technology," *Deccan Herald* (Bangalore), 27 March 1997;

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in FBIS Document FBIS-NES-97-086, 27 March 1997; "Australian Scientists to Help BARC," *Indian Express* (Mumbai), 27 March 1997, www.expressindia.com.

20 March 1997

The representative of Russia's Atomic Energy Ministry Vladislav Petrov tells the *Hindu* that despite US efforts to prevent Russia's deals with India, Iran, and Cuba, "the Russian political leadership has given [a] green light to go ahead with [these] deals and we hope to finalize the contract with India very shortly."

—Vladimir Radyuhin, "Clinton May Pressure Yeltsin on Reactors Sale to India," *Hindu* (Chennai), 21 March 1997, www.hinduonline.com.

20 March 1997

Indian officials state that the protocol for Russia's sale of two VVER-1,000 light water reactors to India will be signed during the visit of Prime Minister H.D. Deve Gowda to Moscow on 23-26 March. US Assistant Secretary of State Robin Raphel tells the US Congress that "[Russian] exports of nuclear power reactors or missile-related equipment and technology to India will be of concern."

—"Russia to Sell Two Nuclear Power Plants to India," *Wall Street Journal* (interactive edition), 21 March 1997, <http://online.wsj.com>.

12 March 1997

A lid of one of the 56 steel barrels of uranium powder is broken during the unloading process at Yadavagiri. The consignment is on its way from the Rare Materials Plant (RMP, Rattenhalli, Karnataka to the Rakha Mines (Jaduguda, Bihar). The officials of RMP underplay the incident, stating that the consignment was "mere radioactive waste" that contained only "0.3-0.4 percent traces" of uranium. [Note: RMP gets natural uranium from the Rakha Mines. After initial processing the RMP returns the waste to the mines for disposal. According to the Chief Clients Officer (Railways) Mr. Ananth, there is a "compulsory packing" (CP) for the transportation of uranium. It includes CP-one packing for uranium powder and "more elaborate" CP-three for the highly radioactive uranium.]

—Vijendra Rao, "Leak Reported in Steel Barrels Containing Uranium," *Deccan Herald* (Bangalore), 14 March 1997; in FBIS Document FBIS-NES-97-073, 14 March 1997.

10 March 1997

India's Minister of External Affairs I.K. Gujral tells Lok Sabha (lower house of parliament) that India and Russia will continue to cooperate in the construction of a nuclear power station in Koodankulam, Tamil Nadu. Gujral assures the House that Russia has not changed its position on the deal despite US pressure.

—"India, Russia to Continue Nuclear Cooperation: Minister," Xinhua General Overseas News Service, 10 March 1997; in Lexis-Nexis Academic Universe, 11 March 1997, <http://web.lexis-nexis.com>.

9 March 1997

Project director of the Rajasthan Atomic Power Station (RAPS-1) V.K. Chaturvedi says that Unit-1 reactor was shut down when the operators discovered a heavy water leak and helium cover gas from the reactor's overpressure relief device. However the reactor is scheduled to restart by the end of March 1997. According to Chaturvedi, "workers finished sealing unit one's overpressure device leak last month with tools developed by Indian nuclear

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scientists." They put "a backing seal of idium metal on the existing nickel seal in the overpressure relief device [which] needed equipment that could be manipulated through a circular opening of only 3.75 inches to reach the nickel seal's remote location inside the calandria," he clarifies. Chaturvedi adds that the subsequent checks and helium leak detection examinations proved the effectiveness of the new seal.

—Neel Patri, "Rajasthan-I Ready to Restart After Three-Year Rehabilitation," *Nucleonics Week*, 20 March 1997; in Lexis-Nexis Academic Universe, 17 April 1997, <http://web.lexis-nexis.com>.

5 March 1997

India's Prime Minister H.D. Deve Gowda tells parliament that no decision has been taken to allow 100 percent foreign ownership of nuclear installations in India and "there is no question of deviating from our nuclear policy." He adds that the government has agreed to allow 100 percent foreign equity in the power sector in general and not specifically in the nuclear power sector. Gowda states that the government is open to specific proposals and will make decisions on case-by-case basis. Gowda assures members of parliament that his government will not make any decision without taking them into confidence.

—"India Will not Accept Foreign Ownership of Nuclear Plants: PM," Agence France Presse, 5 March 1997; in Lexis-Nexis Academic Universe, 5 March 1997, <http://web.lexis-nexis.com>.

2 March 1997

The Indian Institute of Science inaugurates its supercomputing center at Bangalore. The chairman of the Indian Supercomputer Education and Research Center N. Balakrishnan says the facility consists of "300 powerful computers linked by high-speed communication networks." He says the center will be used by a "wide range of researchers," adding that IBM and Microsoft corporations are negotiating "tie-ups" with the center. India's Prime Minister H.D. Deve Gowda calls the center "a landmark so far as [indigenous] development of science and technology in our country [is concerned]." [Note: India set up the Center for Development of Advanced Computing (CDAC) in Pune in 1988. In 1993, when the United States disallowed the sale of a Cray Research Inc. supercomputer to India due to the fear it could be used in India's nuclear and missile programs, India began developing its supercomputer facility indigenously.]

—Michael Drudge, "India / Supercomputer," Voice of America, 3 March 1997; in Executive News Service, 3 March 1997; Hanif Arafat, "India Unveils National Supercomputing Facility," Reuter, 2 March 1997.

March 1997

Prime Minister Deve Gowda grants permission for the sinking of two additional shafts to the ones that already exist at Pokhran for sub-kiloton nuclear tests. He also indicates that he may grant political authorization for conducting nuclear tests in the near future.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 402.

15 February 1997

The government proposes to raise budgetary support for the nuclear power sector to 10.41 billion rupees in the fiscal year 1997-98 from its current 3.5 billion rupees. It is estimated that the expenditures in the forthcoming financial year will include 3.04 billion rupees for the Kaiga Atomic Power Station (KAPS), 2.99 billion rupees for the

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Rajasthan Atomic Power Station (RAPS), 3.14 billion rupees for Tarapur-2 and -3, and approximately 1.16 billion rupees for the Koodankulam project with Russia.

—"Budgetary Aid for Nuclear Power Plan to Be Hiked," *Financial Express* (Mumbai), 16 February 1997, www.expressindia.com.

11 February 1997

At the meeting of Indo-Russian Joint Commission in Moscow, Russia offers a \$2.6 billion credit for the sale of two VVER-1,000 reactors to India and expresses its wish to speed up progress on the deal. Russia's First Deputy Prime Minister Victor Ilyushin says the major obstacle for Indo-Russian trade is India's unwillingness to accept guarantees extended by Russian commercial banks. Both sides make a decision to form a special working group on banking and financial questions.

—Vladimir Radyuhin, "Reactor Deal: Russia Offers Credit," *Hindu* (Chennai), 12 February 1997, www.hinduonline.com; Robert Orttung, "Moscow Holds Firm on Reactor Sale to India," *OMRI Daily Digest*, No.29, Part I, 11 February 1997; "Russia: Nuclear Power Project Discussed during Minister's Visit," *Nezavisimaya Gazeta* (Moscow) 12 February 1997, p. 2; in FBIS Document, FBIS-NES-97-031, 12 February 1997.

8 February 1997

According to US government officials, the United States will acquiesce to the proposed Russia's sale of two VVER-1,000 reactors to India if the latter accepts full-scope safeguards on its nuclear installations. According to the officials, the United States is insisting on this condition not so much because of the expected sale but because India "has many reactors that are already producing plutonium that need to be brought under safeguards." According to the US State Department official Nicholas Burns, the United States will continue to oppose nuclear technology sales to India and Iran because it considers such sales "destabilizing and unsafe."

—Chidanand Rajghatta, "Russian Deal Will Get US Nod if India Allows IAEA Safeguards," *Indian Express* (Mumbai), 9 February 1997, www.expressindia.com.

7 February 1997

Atomic Energy Commission (AEC) Chairman R. Chidambaram and the Minister of External Affairs I.K. Gujral agree to partially repay the Russian credit for the construction of two VVER-1,000 reactors at Koodankulam in hard currency. According to Chidambaram, the government should not keep the Koodankulam project on hold due to the disagreement over the form of loan repayment since Russian aid and light water technology are important to "give the impetus to nuclear energy."

—Shivaji Sarkar, "India to Re-pay Russian Loan in Hard Currency," *Express India* (Mumbai), 9 February 1997, www.expressindia.com; K.K. Katyal, "India to Press Russia for Report on Nuclear Plant," *Hindu* (Chennai), 24 March 1997, www.hinduonline.com.

7 February 1997

In an interview to a Japanese business daily, India's Prime Minister H.D. Deve Gowda says his government intends to allow complete foreign ownership of nuclear power plants in India.

—"India: Gowda Interviewed on Foreign Investment in Nuclear Power," *Nihon Keizai Shimbun* (Tokyo), 8 February 1997; in FBIS Document FBIS-NES-97-027, 8 February 1997; F.J. Khergamvala, "Foreign N-Plants Welcome: PM,"

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Hindu (Chennai), 9 February 1997, www.hinduonline.com; "India to Accept 100 percent Foreign Ownership of Nuclear Plants: Report," Agence France Press, 7 February 1997; in Lexis-Nexis Academic Universe, 7 February 1997, <http://web.lexis-nexis.com>.

6 February 1997

The United States expresses opposition to the proposed Indo-Russian deal for the construction of two VVER-1,000 light water reactors in Koodankulam, Tamil Nadu. US State Department's spokesperson Nicholas Burns says the deal violates the terms of the Nuclear Suppliers' Group (NSG) not to sell nuclear technologies to countries that reject regular inspections by the United Nations, agreed upon in 1992. According to Burns, since India did not accept the NSG guidelines, Russia should not provide any nuclear assistance to India. Russian officials, however, argue that the deal does not violate NSG guidelines since it involves light water reactors and precedes the guidelines by five years.

—"US Opposes Russian Nuclear Plant Sale to India," Deutsche-Press Agentur, 6 February 1997; in Lexis-Nexis Academic Universe, 10 February 1997, <http://web.lexis-nexis.com>.

28 January 1997

India's Prime Minister H.D. Deve Gowda inaugurates a new uranium assembly plant at the Nuclear Fuels Complex (NFC), Hyderabad. He stresses the need to produce energy without any harm to the environment.

—"India: Deve Gowda Opens Uranium Plant in Hyderabad," Delhi Doordarshan Television Network, 28 January 1997; in FBIS Document FBIS-NES-97-019, 28 January 1997.

25 January 1997

Addressing a joint news conference in New Delhi, Minister of External Affairs I.K. Gujral rejects a German appeal to sign the Comprehensive Test Ban Treaty (CTBT) and the NPT.

—"Gujral Rejects Kinkel Plea to Sign CTBT, NPT," *Deccan Herald* (Bangalore), 25 January 1997; in FBIS Document FTS19970806001428, 25 January 1997.

23 January 1997

Minister of State for Science and Technology Y.K. Alagh tells the press that the government is considering several proposals recommending the entry of private sector companies into the field of nuclear power.

—"India May Now Allow Private Sector to Produce Nuclear Power," Deutsche-Press Agentur, 23 January 1997; in Lexis-Nexis Academic Universe, 24 January 1997, <http://web.lexis-nexis.com>.

22 January 1997

S.B. Bhoje, director of the reactor group at the Indira Gandhi Center for Atomic Research (IGCAR), says the conceptual design of the 500MW electrical prototype fast breeder reactor (PFBR) is complete. The construction of the reactor at the estimated cost of 28 billion rupees is planned to commence by 1999 at Kalpakkam and will possibly be completed by 2006-2007. Bhoje adds that pre-fabrication trials for the reactor were held together with the Nuclear Fuels Complex (NFC), Hyderabad, and the Midhani and the Durgapur steel plants. The following organizations are also involved in the project: the Indian Institutes of Technology, Structural Engineering Research Center, Central Building Research Institute (Roorkee), University of Earthquake Engineering (Roorkee), Terminal

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Ballistic Research Institute (Chandigarh), Central Water Power Research Station (Pune), Fluid Control Research Institute (Palakkad), and the Kirloskar Brothers Limited. According to Bhoje, the new features of the plant include the use of uranium-plutonium oxide fuel and sodium as a coolant.

—Maya Ranganathan, "New Reactor at Kalpakkam by 2007," *Indian Express* (Mumbai), 24 January 1997, www.expressindia.com; "India: Commissioning of Kalpakkam Nuclear Power Reactor in 2007," *Deccan Herald* (Bangalore), 23 January 1997; in FBIS Document FBIS-NES-97-015; "350 Cr. For Kalpakkam Fast Breeder Reactor," *Hindu* (Chennai), 14 February 1997, www.hinduonline.com.

21 January 1997

Minister of State for Science and Technology Y.K. Alagh tells Lok Sabha (India's lower house of parliament) that the Ninth Plan will include details for the revival of India's nuclear power sector. Alagh claims that nuclear power plants in India function according to their designed plant load factor, admitting, however, that Kota atomic power station, which shut down in 1995, will not come online until 1998.

—"India: Article Views Nuclear Energy Program," *Hindustan Times* (New Delhi), 21 January 1997; in FBIS Document FBIS-NES-97-013, 21 January 1997.

20 January 1997

The Chief Executive of India's Nuclear Fuels Complex (NFC) K.K. Sinha tells the Indian news agency UNI that the NFC has supplied reactor materials to "Korea" and the "Nuclear Club" member countries like France and the United States. NFC is the exclusive supplier of the critical fuel and zircalloy structural components to India's nuclear reactors. Sinha says that India possesses "extensive deposits" of titanium, zirconium and rare earths in its beach sands. According to Sinha, the NFC plans to produce 400 tons of titanium metal sponge and 500 tons of high purity zirconium oxide during the Ninth Plan.

—"India: Nuclear Fuel Complex Bags 'Prestigious Export Orders'," *Deccan Herald* (Bangalore), 20 January 1997; in FBIS Document FBIS-NES-97-013, 20 January 1997.

13 January 1997

Addressing a press conference in Jullundur, India's Minister of External Affairs I.K. Gujral says India will not sign the Comprehensive Test Ban Treaty (CTBT) in its present form.

—"Gujral-Nation Not to Sign CTBT in Present Form," All India Radio Network (New Delhi), 13 January 1997; in FBIS Document FTS19970113000386, 13 January 1997.

3 January 1997

Delivering a speech at Nehru Center in Mumbai, India's Minister of External Affairs I.K. Gujral says India cannot afford to give up its nuclear option or accept any restraints in the absence of universal nuclear disarmament process. Therefore, India will not sign the Comprehensive Test Ban Treaty (CTBT) unless there is a movement towards global nuclear disarmament.

—"Gujral Says India Cannot Afford to Give Up Its Nuclear Option," All India Radio Network (New Delhi), 3 January 1997; in FBIS Document FTS19970317001463, 3 January 1997.

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3 January 1997

The *Times of India* (Mumbai) reports that a brand new Russian nuclear-powered carrier Varyag is likely to be brought to Gujarat for scrapping because India has "considerable expertise in a [labor intensive] ship breaking job." India's Ministry of Defense refuses to comment on the issue.

—"Delhi to Buy Russian Nuclear-Powered Carrier for Scrapping," *Times of India* (Mumbai), 3 January 1997; in FBIS Document FTS19970103000398, 3 January 1997.

1997

The Atomic Minerals Division of the Department of Atomic Energy (DAE) discovers high quality uranium in the Bhima basin in Gulbarga district of Karnataka.

—"High Grade Uranium Discovered in Karnataka," *Deccan Herald* (Bangalore), 18 July 1997; in FBIS Document FTS19970718000771, 18 July 1997.

1997

The Bhabha Atomic Research Center (BARC) develops a sol-gel technology for the fabrication of nuclear fuel. The pilot plant, employing the technology, will be set up at Tarapur. During the Ninth Plan, a similar plant will be constructed at Kalpakkam. The head of BARC's Fuel Chemistry Division H.C. Jain tells reporters that the technology can help replace the handling of nuclear fuel in powder form. It can be used for fabrication of mixed oxide fuel (MOX) and for spent fuel reprocessing. The technology is also better from the safety point of view since the gel is less hazardous and easier to handle, he says. According to the director of the Indira Gandhi Center for Atomic Research (IGCAR) Dr. Placid Rogriguez, the fuel produced via sol-gel technology has a higher "burn up." The technology was originally developed in the United States and has been tried in Russia, the United Kingdom, and Japan.

—"BARC Develops 'Sol-Gel' for Fabricating N-Fuel," *Hindu* (Chennai), 3 March 1997, www.hinduonline.com.

1997

India's Chief of Naval Staff Admiral Vishnu Bhagwat orders a 'technical audit' of the Advanced Technology Vessel (ATV) project. Vice Admiral R. Ganesh, who earlier commanded the nuclear submarine leased from the Soviet Union between 1988-1991, is appointed project director and made directly responsible to the naval chief. Admiral Bhagwat also proposes to depute naval personnel over sustained periods to create a committed cadre of officers dedicated to designing and building nuclear and diesel submarines.

—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), pp. 657-658.

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1996**1996**

According to press reports, Bharat Heavy Electricals (BHEL) has produced more than 20,000 DC and high tension AC motors for several industries including nuclear power projects. BHEL, India's largest producer of AC/DC motors, can

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manufactures motors with low vibration levels used for operating centrifuge compressors.

—"BHEL Largest Maker of AC/DC Motors," *Financial Express*, 14 October 1996, www.expressindia.com.

4 November 1996

Atomic Energy Commission (AEC) Chairman R. Chidambaram says that two 500MW heavy water reactors will be operational at Tarapur (Maharashtra) by 2003. He adds that two 220MW units will be constructed at Kaiga (Karnataka) and, if finances permit, additional 500MW reactors at Kota (Rajasthan).

—"India: Official Plan for Future Nuclear Power Plants," Delhi All India Network, 4 November 1996; in FBIS Document FBIS-NES-96-215, 4 November 1996.

Early November 1996

A public sector company, Hindustan Machine Tools (HMT), develops a servo-manipulator to be used for handling nuclear material at the Bhabha Atomic Research Center (BARC), Trombay.

—"India: System for Handling Nuclear Materials Developed," Delhi All India Network, 4 November 1996; in FBIS Document FBIS-NES-96-214, 4 November 1996.

29 October 1996

The Kalpakkam Mini Reactor (Kamini), a 30KW (thermal) research reactor, goes critical. The reactor was designed by the scientists at the Bhabha Atomic Research Center (BARC), Trombay and the Indira Gandhi Center for Atomic Research (IGCAR), Kalpakkam. Kamini is the first experimental reactor in India to use Uranium-233 as a fuel. Uranium-233 is obtained by irradiating thorium found in abundance in the monazite sands in Kerala. According to BARC director Anil Kakodkar, Kamini is "an important milestone along the path to extracting the vast energy landlocked in India's thorium reserves." A BARC press release states that "the reactor system consists of U-233 aluminum alloy plates with beryllium oxide encased in zircalloy acting as reflector. Demineralized light water acts as moderator, coolant and shield. The reactor is controlled by the safety control plates, which also provide emergency shut down. The entire reactor system is housed in a stainless steel tank which is surrounded by a high density concrete biological shield." According to the Atomic Energy Commission (AEC) Chairman, R. Chidambaram, the reactor represents a "small but significant step in the thorium cycle [and demonstrates India's] comprehensive capability in the nuclear fuel cycle and its command over a sustainable nuclear energy development program." The Atomic Energy Regulatory Board (AERB) limits the reactor operation to 100 watts. According to the AERB, the reactor will have to undergo a series of tests before it is allowed to work up to its full capacity. Srinivasan says the test sequel should be completed within approximately one month. Kamini will be used for neutron radiography of irradiated fuel of the fast breeder test reactor at Kalpakkam.

—Government of India, *Department of Atomic Energy Annual Report: 1996-1997*, p. 4:1; Neel Patri, "India Starts up Research Unit Using Fuel Made from Thorium," *Nucleonics Week*, 7 November 1996, p. 2; "Kamini to Boost Nuclear Power Generation," *Indian Express* (Mumbai), 31 October 1996, www.expressindia.com; "Uranium 233 Feeds Critical Kamini," *Indian Express* (Mumbai), 30 October 1996, www.expressindia.com; "India: Mini Reactor Kamini Attains Criticality," Delhi All India Radio Network, 29 October 1996; in FBIS Document FBIS-NES-96-210, 29 October 1996; "Experimental Indian Nuclear Reactor Inaugurated," Reuters, 29 October 1996; in Compuserve Executive New Service, 1 November 1996; "New Indian Nuke to Go Online," United Press International, 29 October 1996; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

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28 October 1996

Russia's Deputy Prime Minister Oleg Davydov says India and Russia are "quite near to concluding final agreement" on the construction of two VVER-1,000 nuclear reactors in Koodankulam (Tamil Nadu). He does not disclose the total cost of the contract but says that Russia will provide India with credit and will fund a part of the project cost. —"India, Russia Near Pact to Make 2 India Nuclear Reactors," *Wall Street Journal*, 28 October 1996, <http://online.wsj.com>; Sunil Kataria, "India, Russia Near Nuclear Power Plant Deal," Reuters, 28 October 1996; in Compuserve-Executive News Service, 28 October 1996; "Russia Ready to Help Build Nuclear Reactors," Agence France Presse, 28 October 1996; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "Russia: Upcoming Contract to Build Nuclear Plant in India Seen," *Kommersant-Daily* (Moscow), 31 October 1996; in FBIS Document FBIS-NES-96-213, 31 October 1996.

26 October 1996

India's Department of Atomic Energy (DAE) officials say Russia's demand for payment in US dollars is a major stumbling block for the agreement on the construction of two VVER-1,000 reactors in Koodankulam (Tamil Nadu). DAE estimates that the foreign exchange outflow will constitute between 180 and 200 billion rupees which is "prohibitive." Minister of State for Science and Technology Y.K. Alagh expresses the willingness of the government to reconsider the project to advance the economy of southern states. —Shivaji Sarkar, "Kadamkonam Nuclear Power Project May Be Delayed," *Financial Express* (Mumbai), 27 October 1996, www.expressindia.com.

18 October 1996

Atomic Energy Commission (AEC) Chairman R. Chidambaram says the Department of Atomic Energy (DAE) is working on a design of a "self-sustaining" high breeder reactor with the "very high safety features." Chidambaram adds that the design "basis" was approved by the Atomic Energy Regulatory Board (AERB) and will have the safety features recommended by the Nuclear Power Corporation (NPC) and AERB. He says the reactor is expected to be functional by mid-1998. —"India to Build Advanced High Breeder Reactor," *Indian Express* (Mumbai), 20 October 1996, www.expressindia.com.

15 October 1996

Addressing an international seminar in New Delhi on the relevance of nuclear energy, former Atomic Energy Commission (AEC) Chairman R. Srinivasan says that Europe and India should intensify cooperation in the field of light water reactors in pursuance of mutual interest. —"India Should Go in for Light Water Nuclear Reactors, Expert Says," Deutsche Presse-Agentur, 15 October 1996; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

14 October 1996

The Indian Atomic Energy Forum (IAEF) is initiated in New Delhi. The consortium will deal with the nuclear power projects in India and abroad. G.R. Srinivasan of the Nuclear Power Corporation (NPC) says the IAEF will highlight a unified approach for private companies to start investing in nuclear power projects. The Deputy Director of the International Atomic Energy Agency (IAEA) for nuclear safety Z. Domaratzki speaks in support of India's exports of

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nuclear related technologies and services, saying that with the high standards of safety followed by the NPC, India's isolation has to be ended. He says the IAEA is committed to help India given the country's safety record and the IAEA's agenda to promote nuclear power as the energy of the future.

—"Nuclear Technology Export to Benefit Companies," *India Power Daily* (Mumbai), 15 October 1996, www.power.indiaworld.com; "IAEF to be Launched on October 14," *India Power Daily* (Mumbai), 15 October 1996, www.power.indiaworld.com; "India: Consortium Will Be Launched to Build Nuclear Power Plants," Delhi All India Network, 26 September 1996; in FBIS Document FBIS-NES-96-189, 26 September 1996.

13 October 1996

Nuclear Power Corporation's (NPC) Director for health, safety, and environment G.R. Srinivasan says the NPC is negotiating with private industries to embark on construction of nuclear power plants in India and abroad. According to Srinivasan, developing countries demonstrate a great interest in nuclear power projects and India has the relevant technology and expertise.

—"Nuclear Technology Export to Benefit Companies," *India Power Daily* (Mumbai), 15 October 1996, www.power.indiaworld.com.

4 October 1996

Addressing the 51st Session of the United Nations General Assembly (UNGA), India's Minister of External Affairs I.K. Gujral says that "the only way to achieve ultimate security is to ban production, possession, and use of nuclear weapons within an agreed timeframe." Partial and halfhearted measures of arms control, such as NPT or CTBT [Comprehensive Test Ban Treaty], defeat this objective, by legitimizing possession of nuclear weapons and permitting non-explosive testing of nuclear weapons by nuclear weapon countries. India, therefore, cannot be a party to such flawed arrangements." He remarks that India remains committed to the cause of universal nuclear disarmament and will participate "fully and actively" in any negotiations on a treaty banning nuclear weapons and all types of tests. Gujral adds that India will present the convention on non-use of nuclear weapons at this session of the UNGA.

—Statement by Minister of External Affairs I.K. Gujral, the 51st session of the UN General Assembly, 4 October 1996, New York; Embassy of India, Washington, DC, www.indianembassy.org.

October 1996

Nuclear Power Corporation (NPC) Chairman Y.S.R. Prasad says India wants Russia to build two nuclear reactors at Koodankulam (Tamil Nadu) on a turnkey basis. He says the terms of the deal have to be renegotiated since costs and other factors have changed since 1988, when the deal was signed.

—Neel Patri, "India and Russia Revive Talks for Two VVER-1,000s in South India," *Nucleonics Week*, 24 October 1996, p. 8.

27 September 1996

Kazakhstan offers to sell uranium to India as a part of defense and energy cooperation agreement. An official from Kazakh State Atomic Power Engineering and Industry Corporation (KATEP) says Kazakhstan has "uranium and all the facilities needed to manufacture fuel elements, except uranium enrichment."

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—Andrei Ivanov, "India Will Buy Uranium from Kazakhstan," Interpress Service, 27 September 1996; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

25 September 1996

Defense Research and Development Organization (DRDO) metallurgist Professor P. Rama Rao is appointed chairman of the Atomic Energy Regulatory Board (AERB) for a period of three years.

—"India: New Chairman of Atomic Energy Regulatory Board Named," Delhi All India Radio Network, 25 September 1996; in FBIS-NES-96-187, 25 September 1996.

20 September 1996

In an interview with Asianet TV channel, India's Minister of External Affairs I.K. Gujral says India "may need a nuclear weapon, sometimes [India] may not want a nuclear weapon. But I would not let others decide for us."

—"Indian Minister Says He Will Not Let Others Decide Nuclear Policy," Deutsche Presse-Agentur, 20 September, 1996; in Lexis-Nexis Academic Universe, 20 September 1996, <http://web.lexis-nexis.com>.

15 September 1996

In an interview with *India Today*, India's Minister of External Affairs I.K. Gujral says that India does not have weaponization on its agenda. When the issue will arise depends on India's security environment, he argues. He reiterates that India had to reject the Comprehensive Test Ban Treaty (CTBT) after the new entry-into-force provision (Article XIV) was added. He argues that India became suspicious with the clause to summon a review conference in two years after the CTBT's submission for signature in the case the treaty had not entered into force by that time. The clause states that "measures" will be taken against the nations, which delay the treaty's entry into force. Gujral remarks that India interpreted this statement as a threat of sanctions and hence rejected the treaty. According to Gujral, India will not be isolated due to its refusal to sign the CTBT.

—Raj Chengappa, "We Had No Option," *India Today*, 15 September 1996, p. 78.

11 September 1996

In an address to parliament, India's Minister of External Affairs I.K. Gujral says the government "will maintain its position not to sign the Comprehensive Test Ban Treaty. The entry-into-force will ensure that this treaty shall never enter into force unless its proponents agree to amend this provision in order to remove any possibility of imposing any obligations on India. There have been no pressures on India and if there are any in future, I am confident that this country has the national will to withstand such pressures." He commends the national consensus behind the government's CTBT policy. He adds that India will continue with initiatives towards universal nuclear disarmament in international forums.

—Statement by I.K. Gujral in the Indian Parliament, 11 September 1996; Embassy of India, Washington, DC, www.indianembassy.org.

10 September 1996

In an interview with a Japanese economic daily, India's Prime Minister H.D. Deve Gowda says that India will neither build nuclear weapons nor conduct any more nuclear tests. He remarks that India's nuclear program will be confined solely to power generation.

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—"India not to Make Nuclear Weapons," Xinhua General Overseas News Service, 11 September 1996; in Lexis-Nexis Academic Universe, 12 September 1996, <http://web.lexis-nexis.com>.

10 September 1996

Addressing the 50th session of the United Nations General Assembly (UNGA), India's Permanent Representative to the United Nations in Geneva Arundhati Ghose says that India "is not satisfied with mere preambular references [to nuclear disarmament in the text of the CTBT.]" She remarks that the Comprehensive Test Ban Treaty (CTBT) draft, as it is submitted to the UNGA, "is not only flawed but dangerous." She argues that by banning only explosive testing the CTBT may encourage "a nuclear weapon technology race" and hence cannot be considered a first step towards nuclear disarmament. Ms. Ghose adds that India believes the current CTBT draft "fails in the overarching objective set out in the mandate reiterated in GA resolution 50/65 - 'the enhancement of international peace and security'....It has confirmed and perpetuated the existing global insecurity born of a world divided unequally into nuclear haves and have-nots." Ms Ghose declares "that India will never sign this unequal Treaty, not now, not later."

—Statement in explanation of vote by Ms Arundhati Ghose on Item 65: CTBT at the 50th Session of the UN General Assembly, New York, 10 September 1996; Embassy of India, Washington, DC, www.indianembassy.org.

9 September 1996

Addressing the 50th session of the United Nations General Assembly (UNGA), India's Permanent Representative to the United Nations Prakash Shah says that the UNGA should discuss the Comprehensive Test Ban Treaty (CTBT) "in its essential perspective, the perspective of nuclear disarmament and progress towards the common objective of a nuclear weapon free world." He expresses India's concern that the text of the treaty on which the Conference on Disarmament (CD) did not reach consensus was submitted to the UNGA, bypassing the Ad Hoc Committee on the Nuclear Test Ban to the Plenary of the CD. He underscores that "treaties are made through voluntary agreements and the legitimate exercise of sovereign choice and not by procedural maneuver and political persuasion." Shah adds that India was "deliberately thrust" to oppose the CTBT at the CD when the entry-into-force provision was changed to require India sign the treaty. He points out that India had "no choice but to stop the transmittal of a text containing as it did a provision contrary to international law, a provision which we continue to view as coercive." According to Shah, India's security environment "obliges" it to keep the nuclear option "as long as nuclear weapon states remain unwilling to accept the obligation to eliminate their nuclear arsenals. This is a position which has and shall remain grounded in complete national consensus."

—Statement by Prakash Shah on Item 65: CTBT at the 50th Session of the United Nations General Assembly, New York, 9 September 1996; Embassy of India, Washington, DC, www.indianembassy.org.

8 September 1996

The Parliamentary Committee on Energy demands higher budget allocations for atomic energy. The committee expresses concern over curtailing the nuclear power program and calls for better performance by nuclear power stations. In a report, presented to the parliament, the committee regrets that the capacity addition in the central sector fell short by over 14,100MW during the past four years.

—"India: Committee Demands Increased Allocation for Nuclear Energy," Delhi All India Radio Network, 8 September 1996; in FBIS Document FBIS-NES-96-175, 8 September 1996.

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7 September 1996

In an interview to a private television channel, India's Minister of External Affairs I.K. Gujral says India "will make the weapons [nuclear] as and when it [finds suitable and it is] not going to let others decide for India."

—"India Retains Its Nuclear Option, Says Gujral," Deutsche Presse-Agentur, 7 September 1996; in Lexis-Nexis Academic Universe, 7 September 1996, <http://web.lexis-nexis.com>.

29 August 1996

British Foreign Secretary Malcolm Rifkind says that Britain "fully respects India's right to reach its own decisions on the Comprehensive Test Ban Treaty's negotiations in the light of its security interests." He says the question of sanctions on India due to its opposition to the CTBT is "irrelevant." Rifkind says the international community must try to understand India's concerns and reasons for vetoing the CTBT. He also expresses a hope that India will eventually change its stand on the issue.

—"Britain Still Hopes India Will Change Stand on Nuclear Test Ban," Deutsche Presse-Agentur, 29 August 1996; in Lexis-Nexis Academic Universe, 22 August 1996, <http://web.lexis-nexis.com>.

26 August 1996

India's Minister of External Affairs I.K. Gujral assures the Indian Parliament that the government "is monitoring the developments [on the CTBT] and will take all necessary actions, consistent with [India's] policy, to indicate opposition to this text."

—Suo Motu Statement by I.K. Gujral in the Indian Parliament, 26 August 1996; Embassy of India, Washington, DC, www.indianembassy.org.

22 August 1996

During a press conference in New Delhi, India's Minister of External Affairs I.K. Gujral says India had to veto the Comprehensive Test Ban Treaty (CTBT) because the treaty would compromise India's national security without advancing global nuclear disarmament. He says India is particularly opposed to the treaty's entry-into-force article, which compels India to sign the treaty against its will. He adds that India's refusal to join the CTBT is based on the existential threats from nuclear China and nuclear capable Pakistan. He underscores that "just because [India] did not sign the Treaty, it doesn't mean that [India] is testing new weapons."

—Amy Louise Kazmin, "India Defends Veto of the Test Ban Treaty," United Press International, 22 August 1996; in Lexis-Nexis Academic Universe, 22 August 1996, <http://web.lexis-nexis.com>.

20 August 1996

Addressing the Plenary Meeting of the Conference on Disarmament (CD), India's Ambassador to the United Nations in Geneva Arundhati Ghose says that the Comprehensive Test Ban Treaty (CTBT) draft of 14 August 1996 "does not serve the purpose of promoting the realization of the universal disarmament goals." She says that the text of the treaty does not address "continuing nuclear weapon development and proliferation" in South Asia, which exacerbates India's security concerns. She remarks that modification of the entry-into-force article (Article XIV) "apparently at the insistence of small countries with the clear aim of imposing obligations on India and placing it in a position in which it did not wish to be...is perceived very negatively in [New Delhi]." She declares that India opposes the move to forward the treaty to the UN General Assembly for endorsement.

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—Statement by Ms. Arundhati Ghose in the Plenary Meeting of the Conference on Disarmament, 20 August 1996; Embassy of India, Washington, DC, www.indianembassy.org.

15 August 1996

Addressing the nation on Independence Day, India's Prime Minister H.D. Deve Gowda says that "India will oppose any treaty that discriminates [between nuclear weapon and nuclear non-weapon states] and is imposed on India [Comprehensive Test Ban Treaty]. We will not compromise our national security at any cost."

—"India: Test Ban Threatens Our Security," United Press International, 15 August 1996; in Lexis-Nexis Academic Universe, 16 August 1996, <http://web.lexis-nexis.com>; "India to Oppose Move to Push through Nuclear Test Ban Treaty," Deutsche Presse-Agentur, 15 August 1996; in Lexis-Nexis Academic Universe, 15 August 1996, <http://web.lexis-nexis.com>; "Indian Premier Gowda Talks Tough on Nuclear Test Ban Treaty," Deutsche Presse-Agentur, 15 August 1996; in Lexis-Nexis Academic Universe, 15 August 1996, <http://web.lexis-nexis.com>.

14 August 1996

India blocks consensus on the Comprehensive Test Ban Treaty (CTBT) at the Conference on Disarmament (CD) at Geneva.

—George Perkovich, "India Rejects The CTBT," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 383.

12 August 1996

Addressing the press in Bhutan, India's Minister of External Affairs I.K. Gujral says India will not succumb to the US pressure to sign the Comprehensive Test Ban Treaty (CTBT) since "no one can bring India down to its knees when there is national consensus to oppose the treaty."

—"India Not to Succumb to US Pressure on CTBT, Says Gujral," Deutsche Presse-Agentur, 12 August 1996; in Lexis-Nexis Academic Universe, 12 August 1996, <http://web.lexis-nexis.com>.

9 August 1996

During the meeting with India's Ambassador to the United States Naresh Chandra, the US Secretary of State Warren Christopher urges India not to block the Comprehensive Test Ban Treaty (CTBT) at the Conference on Disarmament (CD).

—"US Secretary of State Christopher Urges India Not to Block the Test Ban Treaty," BBC Summary of World Broadcasts, 10 August 1996; in Lexis-Nexis Academic Universe, 9 August 1996, <http://web.lexis-nexis.com>.

8 August 1996

Addressing the plenary session of the Conference on Disarmament (CD), India's Ambassador to the United Nations in Geneva Arundhati Ghose says that the Comprehensive Test Ban Treaty (CTBT) draft of 28 June 1996 "not only ignores [India's] substantive objections but also contains Article XIV, to which [India has] the strongest objections." She remarks that the article seeks to oblige India to sign the treaty against its will, totally disregarding India's stated refusal to accede to the treaty. She declares that the Indian government "would be reluctantly obliged to oppose" the efforts to impose the treaty in its present form on India. She adds that India does not intend to prevent the countries wishing to accede to the treaty from exercising their sovereign right. At the same time, India

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will not allow "its sovereign right not to sign the treaty taken away and accept obligations on India that [it] cannot and will not accept."

—Statement by Ms. Arundhati Ghose, in the Plenary of the Conference on Disarmament, 8 August 1996; Embassy of India, Washington, DC, www.indianembassy.org.

7 August 1996

Brajesh Mishra, chairman of the Bharatiya Janata Party's (BJP) foreign affairs cell, tells reporters in New Delhi that India should carry out one or more nuclear tests in order to be able to design "nuclear warheads for our missiles." Mishra says India's nuclear status is justified in the regional environment "with China a nuclear power and Pakistan a 'nuclear threshold power'." He urges the government of H.D. Deve Gowda to prevent passage of the Comprehensive Test Ban Treaty (CTBT) at the Conference on Disarmament (CD) in Geneva, noting that the "draft treaty in its present form would only perpetuate the situation of the nuclear haves and have nots." He says India should block the treaty if its entry-into-force provision is not changed to eliminate the requirement of India's mandatory adherence to the treaty.

—"India: BJP Demands 'Two Nuclear Tests' to Develop Warheads," *Hindu* (Chennai), 8 August 1996, p. 7; in FBIS Document FBIS-NES-96-155, 8 August 1996; "BJP Urges Nuclear Tests to Perfect Warheads," *Washington Times*, 10 August 1996, p. A7; "Indian Opposition Urges Nation to 'Go Nuclear'," Reuters, 7 August 1996; in Compuserve Executive News Service, 8 August 1996.

August 1996

India's Minister of External Affairs I.K. Gujral writes to the US Secretary of State Warren Christopher, suggesting that the draft of the proposed Comprehensive Test Ban Treaty (CTBT) be modified.

—"India's Foreign Minister Seeks Modification of Nuclear Draft," BBC Summary of World Broadcasts, 19 August 1996; in Lexis-Nexis Academic Universe, 18 August 1996, <http://web.lexis-nexis.com>.

August 1996

Nuclear Power Corporation (NPC) Director G.R. Srinivasan says the repairs of the leak of heavy water in a pressure system of the Rajasthan Atomic Power Station-1 (RAPS) will be completed by December and the unit will be restarted in January 1997. The unit has been shut down since February 1996. There are plans to replace all of the unit's channels with the ones designed to increase its capacity by 50MW and extend operational life by 15-16 years.

—"Repairs Continue at Rajasthan," *Nuclear Engineering International*, September 1996, p. 4.

End of July 1996

The nuclear devices emplaced in the test shafts are removed following denial of permission for a testing program by the Deve Gowda government.

—George Perkovich, "India Verges on Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 377.

31 July 1996

Addressing the Indian parliament, India's Minister for External Affairs I.K. Gujral expresses dismay over the nuclear

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tests carried out at the time of the Comprehensive Test Ban Treaty (CTBT) negotiations. He says that "ongoing testing programs, whether at the test sites or in the laboratories, are clear indications that the nuclear weapon states are not willing to give up their reliance on their nuclear arsenals and consider the CTBT merely as a nonproliferation measure. Such testing programs inevitably give rise to questions relating to India's national security. While we have adopted a policy of restraint after demonstrating our capability, we remain fully conscious of the evolving security situation. We are committed to taking all steps necessary to enable us to cope with any threat that may be posed to the security of India." He adds that the government cannot permit "any language" in the text of the CTBT that will directly or indirectly impose an obligation on India.

—Statement by I.K. Gujral, Minister of External Affairs, in the Indian Parliament, 31 July 1996; Embassy of India, Washington, DC, www.indianembassy.org.

28 July 1996

Speaking on the eve of a session of the Conference on Disarmament (CD) in Geneva, India's Minister for External Affairs I.K. Gujral says India cannot accept the Comprehensive Test Ban Treaty (CTBT) in the present form because it asks India to give up its nuclear option. He says his government is ready to accept being isolated and aims to safeguard India's "vital security interest."

—"India Not Ready to Accept Comprehensive Test Ban Treaty," Deutsche Presse-Agentur, 28 July 1996; in Lexis-Nexis Academic Universe, 17 June 1996, <http://web.lexis-nexis.com>.

15 July 1996

Addressing parliament, India's Minister for External Affairs I.K. Gujral says that without stating a commitment to the time-bound elimination of nuclear weapons in the text of the Comprehensive Test Ban Treaty (CTBT), the treaty "will be an end in itself rather than a first step on the road to nuclear disarmament." Gujral emphasizes that India's nuclear policy is intimately linked to its national security concerns. He reiterates that the Indian government continues to maintain the "option so that [India] is able to take all necessary measures to cope with any threat that may be posed to the security of the nation. [The government] cannot allow this option to be restricted in any manner if other countries remain unwilling to accept the obligation of eliminating their nuclear arsenals." He remarks that in the prevailing circumstances it is "inescapable" that national security considerations govern India's decision-making. Gujral states that India cannot accept the CTBT "in the present form" since the text does not address the issues of concern to India. He says, however, that India will remain engaged in the negotiations "to ensure that [its] freedom of choice is not constrained in any manner." India's approach will remain responsible, he adds.

—Statement by I.K. Gujral, Minister of External Affairs, in the Indian Parliament, 15 July 1996; Embassy of India, Washington, DC, www.indianembassy.org.

15 July 1996

Speaking at a workshop at the Tamil Nadu Agricultural University (Coimbatore), D.D. Sood, director of the Bhabha Atomic Research Center's (BARC) Radio-Chemistry and Isotope Group, says the nuclear fuel reprocessing plant under construction at Kalpakkam is in the final stages of construction, adding that reprocessing plants are already functioning at Tarapur and Trombay. Sood says India possesses thorium reserves enough for generating 300,000MW of energy for 300 years. He notes that nuclear power plants add only 1.1 percent to the existing

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radiation level in India and, thus, are not only viable but also "indispensable and profitable" for India.

—"Kalpakkam N-Fuel Reprocess Plant Almost Ready," *Hindu* (Chennai), 16 July 1996, www.hinduonline.com.

13 July 1996

Addressing a press conference in Hyderabad, the Chief Executive of the Nuclear Fuels Complex (NFC) K.K. Sinha says the NFC is planning to commission three plants between December 1996 and June 1997. The planned expansion project consists of uranium oxide fabrication, zirconium fabrication, and uranium fuel assembly plants. According to Sinha, the project costs are estimated at 2.15 billion rupees and will be met by the NFC's budgetary allocations. Sinha says that production capacity of nuclear fuel will go up to 400 tons after the plants' commissioning.

—"NFC Gearing to Double Uranium Output," *Hindu* (Chennai), 15 July 1996, www.hinduonline.com; "India: Nuclear Fuel Complex to Double Production by December," Delhi All India Network, 14 July 1996; in FBIS Document FBIS-NES-96-137, 14 July 1996.

11 July 1996

Addressing parliament, India's Minister of State for Science and Technology Y.K. Alagh says that Thailand has turned down India's offer to set up a "nuclear research reactor of advanced design in that country."

—"Thailand Turns Down India's Offer of Nuclear Research Reactor," Deutsche Presse-Agentur, 11 July 1996; in Lexis-Nexis Academic Universe, 17 June 1996, <http://web.lexis-nexis.com>.

Early July 1996

Unit 1 of the Kaiga Atomic Power Station (KAPS) is scheduled to go critical in July pending approval from the Atomic Energy Regulatory Board (AERB). According to a former AERB Chairman A. Gopalakrishnan (retired 15 June), the Nuclear Power Corporation (NPC) has not met the AERB's design specifications. Commenting on the design of the project, Additional Chief Engineer S.V. Rajgopalan (civil) says, "Kaiga would have pressurized water reactors which use naturally occurring uranium as fuel and heavy water as coolant for the core of the reactor and moderator. The use of natural uranium eliminates sudden power excursions during operation." Talking about the safety issues, Additional Engineer (planning) M.V. Rao says that "protection against any radiation leakage into the atmosphere is exceptionally strong [at Kaiga]. Uranium dioxide pellets and the zircalloy cladding of the fuel, which are housed in zircalloy pressure tubes, comprise the primary defense. For radiation to leak, the fuel has to overheat and rupture the zircalloy sheath. To prevent overheating due to loss of coolant, a highly reliable coolant injection system is provided. Finally, the reactor is located inside two sealed concrete buildings, forming the "double containment." According to press reports, agitation by ecologists and antinuclear activists against the Kaiga project "may delay the commissioning but is unlikely to stall it, given a lack of political and local support."

—"Row Over Dome Design Delays Kaiga Atomic Project," *India Power Daily* (Mumbai), 2 July 1996, www.power.indiaworld.com; "With Weak Green Lobby and Locals Not Against it Per se, Kaiga May Sail Through," *India Power Daily* (Mumbai), 4 July 1996, www.power.indiaworld.com.

June-July 1996

Prime Minister Deve Gowda consults Finance Minister P. Chidambaram and Foreign Minister I.K. Gujral on the question of conducting nuclear tests. Both ministers advise against conducting tests in the near term for economic

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and foreign policy reasons.

—Raj Chengappa, "Why Play Pahalwan?" *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (2000: Harper Collins Publishers India, New Delhi), p. 398.

June-July 1996

India rejects the proposed draft of the Comprehensive Test Ban Treaty (CTBT) at the Conference on Disarmament, Geneva. India's Foreign Secretary Salman Haider says India will keep its nuclear option without disengaging from CTBT negotiations. According to Haider, India's objections to the CTBT are based on the fact that the treaty aims to contain only horizontal, not vertical, proliferation; since the treaty bans only the nuclear explosions while allowing for hydro-nuclear, hydro-dynamic, sub-critical tests, and computer simulations. He says the treaty lacks verification mechanisms to check for the transfer of nuclear technology from nuclear weapon states to their clients and does not guarantee India's security. He adds India will continue to press for the total elimination of nuclear weapons in a time-bound framework.

—"India Delivers Blow to Nuclear Test Ban," *Jane's Defense Weekly* (Coulson, Surrey), 3 July 1996, pp. 27-29.

June 1996

A senior official at India's defense ministry says it is time for India to abandon its policy of keeping the nuclear option open and "examine how best to translate this into effective deterrence to safeguard our vital interests in political and military terms" since "there is no longer any ambiguity about reports that China has helped Pakistan with its nuclear program and has supplied to it nuclear capable M-11 medium range missiles."

—"India: Officials Claim Nation Faces Nuclear Threat from Neighbors," *Times of India* (Mumbai), 28 June 1996; in FBIS Document FBIS-NES-96-128, 28 June 1996.

June 1996

India says it will withdraw from the Group of Experts' Seismological Technical Tests (GESTT) in case it becomes a part of the International Monitoring System under the Comprehensive Test Ban Treaty (CTBT). According to the press reports, New Delhi intends to dismantle three seismic monitoring stations across the country constructed to detect nuclear explosions under GESTT.

—"India to Quit Nuke Monitor Club," Reuters, 26 June 1996; in Compuserve-Executive News 26 June 1996.

28-29 June 1996

Bharatiya Janata Party (BJP) President L.K. Advani says his party wants India "to have nuclear parity with neighbors." He says there is "no reason" for India to refrain from developing a nuclear deterrent when both China and Pakistan have developed nuclear weapons.

—Nelson Graves, "India Under the Gun to Build Nuclear Weapons," Reuters, 30 June 1996; in Compuserve-Executive News, 30 June 1996.

24 June 1996

Lev Ryabev, the Deputy Minister of Atomic Energy of the Russian Federation, tells the Interfax news agency that Russia is not going to link its cooperation with India in the field of nuclear energy to India's stance on the Comprehensive Test Ban Treaty (CTBT). According to Ryabev, an agreement on construction of the power station

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in Koodankulam (Tamil Nadu) is in progress. The value of this contract may exceed \$1 billion.

—"Minatom RF ne nameren uvyazyvat kontrakty s Indiyey v yadernoy oblasti s eyo prisoedineniem k DZYAI," Interfax, 24 June 1996.

20 June 1996

India's Foreign Secretary Salman Haider states at a press conference in New Delhi that India cannot subscribe to the Comprehensive Test Ban Treaty (CTBT) in its present form because the treaty is not "truly comprehensive" and not connected to "a specifically timed nuclear disarmament program." He says that for India, the security environment in South Asia is a "key consideration" and the treaty does not contribute to its improvement.

—Kanak Nair, "India Declares Intention Not to Sign Test Ban Treaty," Japan Economic Newswire, 20 June 1996; in Lexis-Nexis Academic Universe, 20 June 1996, <http://web.lexis-nexis.com>.

20 June 1996

India refuses to sign the Comprehensive Test Ban Treaty (CTBT) at the Conference on Disarmament (CD) in Geneva until a time-bound framework for total elimination of nuclear weapons is set up. India's Ambassador to the CD Arundhati Ghose says that the drafted scope of the treaty "remains very narrow and does not fulfill the requirement of a comprehensive ban [but rather] a nuclear weapon test explosion ban treaty. The CTBT that we see emerging appears to be shaped more by the technological preferences of the nuclear weapon states rather than the imperatives of nuclear disarmament. This was not the CTBT that India envisaged in 1954. This cannot be the CTBT that India can be expected to accept." Ms. Ghose declares that the "inconsistency in the approach [to nuclear disarmament] can only be explained by the desire to retain a monopoly, a desire which is sought to be futured by the CTBT. We cannot accept that it is legitimate for some countries to rely on nuclear weapons for their security while denying this right to others." Given these circumstances, she adds, national security has become a key factor in India's decisionmaking. She asserts that an emerging "flawed and eternal treaty" is not a measure towards comprehensive nuclear disarmament and hence "is not in India's national security interest. India therefore cannot subscribe to it in its present form." Ghose emphasizes that India will not accept "any language in the treaty text, which would affect [India's] sovereign right to decide, in the light of supreme national interest, whether [it] should or should not accede to such a treaty."

—Arundhati Ghose, Statement at the Plenary Meeting of the Conference on Disarmament, Geneva, 20 June 1996; Embassy of India, Washington, DC, www.indianembassy.org; "India to Quit Nuke Monitor Club," Reuters, 26 June 1996; in Compuserve-Executive News 26 June 1996; Christopher Bellamy, "India Pose Threat to Nuclear Test Ban Treaty," *Independent* (London), 21 June 1996, p. 10; in Lexis-Nexis Academic Universe, 21 June 1996.

18 June 1996

The outgoing head of India's Atomic Energy Regulatory Board (AERB) A. Gopalakrishnan warns that serious safety concerns at India's nuclear power plants are not being adequately addressed. He remarks that the Department of Atomic Energy (DAE) has largely ignored AERB's recommendations thus making the AERB "subservient to those whom it is supposed to regulate." Gopalakrishnan declares India's nuclear-regulatory process "a total farce."

—"Regulator: India Failing in Nuke Safety," United Press International, 18 June 1996; in Lexis-Nexis Academic Universe, 19 June 1996, <http://web.lexis-nexis.com>; Madhvi Nainan, "Most Indian Atomic-Power Stations Unsafe:

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Ex-Nuclear Regulatory Chief," Agence France Presse, 18 June 1996; in Lexis-Nexis Academic Universe, 18 June 1996, <http://web.lexis-nexis.com>.

17 June 1996

In an interview to the *Indian Express* (Mumbai), India's External Affairs Minister I.K. Gujral says India will have to "safeguard its security interests" since the nuclear weapon states are not willing to agree with it on the issues of phased nuclear disarmament in a specified timeframe. He remarks that "the ultimate criteria for [the talks] in Geneva will be national interest."

—"Decisive Phase of Nuclear Test Ban Talks, India Toughens Its Stand," Deutsche Presse-Agentur, 17 June 1996; in Lexis-Nexis Academic Universe, 17 June 1996, <http://web.lexis-nexis.com>.

15-16 June 1996

Former prime minister and a senior leader of the Bharatiya Janata Party (BJP) Atal Bihari Vajpayee says India "should get out of the CTBT [Comprehensive Test Ban Treaty]" because it does not serve New Delhi's concerns regarding disarmament.

—"Decisive Phase of Nuclear Test Ban Talks, India Toughens Its Stand," Deutsche Presse-Agentur, 17 June 1996; in Lexis-Nexis Academic Universe, 17 June 1996, <http://web.lexis-nexis.com>.

12 June 1996

A retired vice admiral of the Indian Navy, K.R. Menon, tells *Defense News* that the Indian Navy "does not have the full expertise to build a nuclear submarine, and India will need a fresh infusion of talent and money" to proceed with its Advanced Technology Vessel (ATV) project. According to Menon's estimates, the Navy would need "at least \$714.3 million" to complete the project. The project is experiencing problems in building a containment vessel for the reactor, as well as several "integration and fabrication" problems.

—Vivek Raghuvanshi, "Technical Snags Frustrate Indian Nuclear Sub Program," *Defense News* (Springfield, VA), 24-30 June 1996, p. 40.

7 June 1996

H.S. Surjeet, a Politburo member of the Communist Party of India (Marxist) that supports the current coalition government from the outside, says "there is absolutely no question" for India to sign the Comprehensive Test Ban Treaty (CTBT). He adds that the government has to safeguard India's interests and cannot submit to the threat of sanctions.

—"Hitch over India Signing the Nuclear Test Ban Treaty," Deutsche Presse-Agentur, 7 June 1996; in Lexis-Nexis Academic Universe, 7 June 1996, <http://web.lexis-nexis.com>; "India Declines to Comment on Signing Nuclear Test Ban Treaty," Deutsche Presse-Agentur, 7 June 1996; in Lexis-Nexis Academic Universe, 7 June 1996, <http://web.lexis-nexis.com>.

7 June 1996

India's Minister for External Affairs I.K. Gujral says that New Delhi has conveyed to the international community its requirement that the Comprehensive Test Ban Treaty (CTBT) be linked to a specified time frame for complete elimination of nuclear weapons. He adds that India has made its proposed "suggestions and amendments" to the

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draft document.

—"India Declines to Comment on Signing Nuclear Test Ban Treaty," Deutsche Presse-Agentur, 7 June 1996; in Lexis-Nexis Academic Universe, 7 June 1996, <http://web.lexis-nexis.com>.

5 June 1996

India's United Front (UF) government issues a policy document stating that it will retain its nuclear option while continuing to work towards global nuclear disarmament. The new government is scheduled to seek a confidence vote in the Lok Sabha (lower house of parliament) on 12 June 1996.

—Rahul Bedi, "India Vows to Keep Nuclear Option," *Daily Telegraph* (London), 6 June 1996, p.9; Javed Naqvi, "Indian Government Sets Nuclear, Kashmir Policies," Reuters, 5 June 1996; in Compuserve-Executive News Service 5 June 1996.

3 June 1996

India's new Defense Minister Mulayam Singh Yadav declares that his United Front (UF) government "will spend every single penny of available resources to upgrade the capability of the armed forces. The government will take all steps to ensure that our armed forces remain in a state of readiness better than that of any potential enemy."

—"New Indian Defense Minister Pledges to Hike Defense Budget," Agence France Presse, 3 June 1996; in Lexis-Nexis Academic Universe, 3 June 1996, <http://web.lexis-nexis.com>.

Early June 1996

Prime Minister Deve Gowda summons Ambassador Arundhati Ghose for a meeting at parliament house in New Delhi to discuss India's future course of action on the Comprehensive Test Ban Treaty (CTBT). Among others, the meeting is also attended by Foreign Minister Gujral, Foreign Secretary Salman Haider, and Rakesh Sood, Director of Disarmament at the Ministry of External Affairs (MEA). Ghose advises the prime minister that if the entry-into-force (EIF) of the treaty is changed, India ought not to be a party to the treaty, but should not oppose it either. However, if the EIF provision remains unchanged then India should "block everything, even the transmission of the CD [Conference on Disarmament] report to the UN General Assembly." Gowda and other participants in the meeting endorse this strategy.

— Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-to-Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 393-394.

June 1996

US President Bill Clinton writes to Foreign Minister Gujral urging India not to reject the Comprehensive Test Ban Treaty's (CTBT) entry-into-force (EIF) clause and sign the treaty.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-to-Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 392.

1 June 1996

Indian nuclear and defense scientists renew their request to the United Front (UF) government, led by Deve Gowda, to authorize the pending nuclear tests. Prime Minister Gowda does not veto the scientists' request, but he also does not consider the tests a high priority. [Note: Subsequent to the May 1998 tests, former Prime Minister

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Deve Gowda revealed that he had declined permission for the tests for economic reasons, and not because he feared international repercussions.]

— George Perkovich, "India Verges On Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 376.

1 June 1996

India's President Shankar Dayal Sharma invites the United Front (UF) coalition, led by H.D. Deve Gowda, to form a government in New Delhi.

—"Deve Gowda Sworn in as a Prime Minister," Agence France Presse, 1 June 1996; in Lexis-Nexis Academic Universe, 1 June 1996, <http://web.lexis-nexis.com>.

June 1996

With reference to the entry-into-force (EIF) clause of the Comprehensive Test Ban Treaty (CTBT), the British delegation to the Conference on Disarmament (CD) proposes that all countries that have offered to host seismic stations as part of the international monitoring system should have to sign the CTBT. In response, India withdraws its offer to host a seismic facility. Indian Ambassador Arundhati Ghose warns that India will not sign the treaty unless its name is taken off the list of 44 countries required to sign the CTBT to bring it into force. The Indian delegation maintains that forcibly putting India's name on the list in the 44-nation list, contravenes the Vienna Convention on treaties that forbids compelling a sovereign state to sign a treaty not in its national interest.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-to-Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 391.

May 1996

Captain Richard Sharpe says in *Jane's Fighting Ships* that the Indian Navy has already tested the nuclear propulsion for India's Advanced Technology Vessel (ATV) or nuclear submarine project. According to Sharpe, the fabrication of the 6,000 ton displacement hull will begin in 1997 and the project is expected to be completed by 2004. Sharpe adds that India is seeking assistance from the Russian submarine development organization Rubin in order to develop the pressurized water reactor capable of producing 190MW of power. Rubin is cooperating with the Defense Research and Development Organization (DRDO), he says.

—Mahesh Hebbar, "India: Russia to Aid in Building First Nuclear Sub by 2004," *Asian Age* (New Delhi), 25 May 1996; in FBIS Document FBIS-NES-96-105, 25 May 1996.

28 May 1996

The BJP government fails to win the vote-of-confidence in parliament.

—"Deve Gowda Sworn in as a Prime Minister," Agence France Presse, 1 June 1996; in Lexis-Nexis Academic Universe, 15 May 1996, www.lexis-nexis.com.

May 1996

Prime Minister Vajpayee is advised that the Bharatiya Janata Party (BJP) will most likely lose the vote-of-confidence in parliament and should postpone the nuclear tests until such time that it gains a parliamentary majority. Vajpayee agrees to postpone the tests so as not to saddle the successor government with a testing

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program's domestic and international repercussions.

—George Perkovich, "India Verges on Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 375.

24 May 1996

Admiral Vijay Singh Shekhawat, India's Chief of Naval Staff, says India is not going to rush with the nuclear submarine program. Although the Navy is eager to have a nuclear-powered submarine, financial constraints are a significant hurdle, he adds.

—Pamela D'Mello, "India: Navy Chief Denies Plan for Nuclear Submarines by 2004," *Asian Age* (New Delhi), 25 May 1996; in FBIS Document FBIS-NES-96-105, 25 May 1996.

May 1996

Subsequent to the discovery by US intelligence sources of India's renewed test preparations, the Clinton administration issues quiet demarches to the Vajpayee government to exercise restraint.

—George Perkovich, "India Verges on Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 374.

16 May 1996

Atal Bihari Vajpayee is sworn in as prime minister of India. Vajpayee has to prove he has the support of a parliamentary majority by 31 May 1996. Pramod Mahajan is appointed as India's defense minister. Vajpayee immediately authorizes a program of nuclear tests. Subsequent to his authorization, at least one nuclear device is emplaced in a test shaft.

—Mark Nicholson, "India's BJP Party Leader to Be Sworn in as PM," *Financial Times* (London), 16 May 1996, pp. 1, 12; Vivek Raghuvanshi, "India's New Leaders to Fortify Nuke Policy, Heighten Readiness," *Defense News* (Springfield, VA), 20-26 May 1996; George Perkovich, "India Verges on Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 374.

15 May 1996

India's President Shankar Dayal Sharma invites the Bharatiya Janata Party (BJP) to form a government in New Delhi. He appoints Atal Bihari Vajpayee as prime minister. The BJP and its allies, the Samata party, and two regional parties from Haryana and Punjab hold 195 seats in the 545-seat lower house of parliament (Lok Sabha), 77 seats short of majority.

—John F. Burns, "Hindu Party Head Chosen for Post of India's Premier," *New York Times*, 16 May 1996, pp. A1, A6; Mark Nicholson, "India's BJP Party Leader to Be Sworn in as PM," *Financial Times* (London), 16 May 1996, pp. 1, 12; Ashok Sharma, "President Invites Hindu Nationalist to Form Government," Associated Press, 15 May 1996; in Lexis-Nexis Academic Universe, 15 May 1996, <http://web.lexis-nexis.com>.

14 May 1996

Speaking at the news conference, Atal Bihari Vajpayee says that his party expects that the nuclear "haves" will embark on elimination of their nuclear stockpiles. Otherwise, India will do "whatever is required" to safeguard its security.

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—Vivek Raghuvanshi, "India's New Leaders to Fortify Nuke Policy, Heighten Readiness," *Defense News* (Springfield, VA), 20-26 May 1996.

24 April 1996

Senior Bharatiya Janata Party (BJP) leader Atal Bihari Vajpayee says that his party "will keep the nuclear option open to protect India" if voted to power. He adds that India needs "to be prepared not to rely on the intentions of others." He says the BJP will increase India's defense budget.

—"Hindu Party Leader Vows to Keep Open India's Nuclear Option," Deutsche Presse-Agentur, 25 April 1996; in Lexis-Nexis Academic Universe, 25 April 1996, <http://web.lexis-nexis.com>.

18 April 1996

The Rajasthan Atomic Power Station (RAPS) is temporarily shut down.

—"Indian State Shuts Off Industry Lights," United Press International, 18 April 1996; in Lexis-Nexis Academic Universe, 19 April 1996, <http://web.lexis-nexis.com>.

7 April 1996

The Bharatiya Janata Party (BJP) issues its 80-page election manifesto. The party aims at a "strong and secure India" that will be a major player at the international arena. In the manifesto the BJP promises to exercise the option to "induct" nuclear weapons, proceed with the production and deployment of Prithvi and Agni ballistic missiles, upgrade conventional weapons systems, link defense expenditure to real requirements, and seek "sovereign equality among nations" in handling security and foreign policies. According to the manifesto, the BJP intends to set up national security council that reevaluate India's nuclear policy. The BJP announces it will not accept the world of nuclear apartheid and not sign the Comprehensive Test Ban Treaty (CTBT) and the Fissile Materials Cut-Off Treaty (FMCT) unless other nuclear powers agree to a time-bound elimination of nuclear weapons.

—"India: BJP Declares Readiness to Deploy Nuclear Weapons," *Business Standard* (New Delhi), 8 April 1996; in FBIS Document FBIS-NES-96-070, 8 April 1996; "India: BJP Promises 'Sweeping' Changes," *Hindustan Times* (New Delhi), 8 April 1996; in FBIS Document FBIS-NES-96-070, 8 April 1996; "India: Bharatiya Janata Party Releases Election Manifesto," Delhi All India Radio Network, 7 April 1996; in FBIS Document FBIS-NES-96-069, 7 April 1996; "Opposition Party Backs Indian Nuclear 'Sword'," *Washington Times*, 8 April 1996, p.A10; "India: Experts Say New Government Needs to Declare Nuclear Policy," *Hindustan Times* (New Delhi), 29 April 1996; in FBIS Document FBIS-NES-96-086, 29 April 1996.

7 April 1996

Former Bhabha Atomic Research Center (BARC) Director A.N. Prasad tells *Indian Express* (Mumbai) that the spent fuel reprocessing plant at Trombay has accumulated 1.5 to 2 million liters of liquid radioactive waste. He adds that the waste storage tanks at Trombay and Tarapur need repairs since they are at least 25 years old.

—"Highly Radioactive Waste Accumulating in India's Atomic Plant," Deutsche Presse-Agentur, 7 April 1996; in Lexis-Nexis Academic Universe, 19 April 1996, <http://web.lexis-nexis.com>.

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April 1996

Sources in India's Atomic Energy Commission (AEC) say that the situation with the deal on the construction of two VVER-1,000 reactors in Koodankulam (Tamil Nadu) with Russia's help is "very fluid." Russia wants to renegotiate the agreement signed in 1988 to attach safeguards to these facilities and to settle the payment terms in hard currency.

—Jyoti Malhotra, "India: US Pressure Cited for Faltering Russian Nuclear Deal," *Business Standard* (New Delhi), 23 April 1996; in FBIS Document FBIS-NES-96-080, 23 April 1996.

April 1996

The Janata Dal party's election manifesto says the party will "continue to oppose the NPT and its adjunct CTBT [Comprehensive Test Ban Treaty]." The Communist Party of India (Marxist) advocates against the "attempts to impose" the NPT and the CTBT on India. The Congress party's manifesto says the party "favors a nuclear-weapon-free world and will continue efforts for total and complete disarmament, particularly nuclear disarmament." The Congress indicates that in the case of Pakistan's development and deployment of nuclear weapons, India will have to review its nuclear policy to meet the threat.

—Mahesh Uniyal, "Disarmament-India: Nuclear Bomb an Election Issue," Inter Press Service, 21 April 1996; in Lexis-Nexis Academic Universe, 23 April 1996, <http://web.lexis-nexis.com>; "India: Experts Say New Government Needs to Declare Nuclear Policy," *Hindustan Times* (New Delhi), 29 April 1996; in FBIS Document FBIS-NES-96-086, 29 April 1996.

Spring 1996

Frustrated with the Comprehensive Test Ban Treaty (CTBT) negotiations at the Conference on Disarmament (CD) in Geneva, Indian Ambassador to the CD Arundhati Ghose recommends that India pull out of the negotiations. However, Ghose is overruled by the Ministry of External Affairs on grounds that there was no distinction between pulling out of the treaty and blocking it.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 390.

March 1996

The *Indian Express* (Mumbai) reports that the storage tanks, containing radioactive waste from the CIRUS and Dhruva reactors have developed leaks.

—"India Commissions Third Nuclear Fuel Reprocessing Plant," Deutsche Presse-Agentur, 27 March 1996; in Lexis-Nexis Academic Universe, 27 March 1996, <http://web.lexis-nexis.com>; Rahul Bedi, "Nuclear Safety Flaws Played Down," *South China Morning Post*, 28 March 1996; in Lexis-Nexis Academic Universe, 29 March 1996, <http://web.lexis-nexis.com>.

27 March 1996

The Safe Energy Communication Council (SECC) issues a report stating that India's nuclear program is plagued with technical delays and cost overruns "despite its strong scientific infrastructure." The report indicates that the performance of India's nuclear reactors is among the lowest in the world, averaging 28 percent of rated capacity. The report notes that India operates "some of the world's most accident-prone and inefficient nuclear facilities."

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Commenting on the report, the Managing Director of India's Nuclear Power Corporation (NPC) Y.S.R. Prasad says the actual capacity of India's reactors is about 40 percent and this is largely due to the accident at Narora (March 1993), when the NPC had to shut down and inspect the turbo-generators of all plants. According to Prasad, the SECC "may not have made its assessments properly."

—"Indian Nuclear Plants Unsafe," *Hindu* (Chennai), 6 April 1996, p. 16.

27 March 1996

Atomic Energy Commission (AEC) Chairman R. Chidambaram inaugurates a final testing of India's third nuclear fuel reprocessing plant at Kalpakkam. He initiates "a trial chopping of unirradiated natural uranium fuel assemblies" as the first stage of "cold commissioning." A comprehensive testing program of the plant will be carried out before the operations with the first batch of spent fuel from the Madras Atomic Power Station (MAPS) commence within about six months. The plant will separate plutonium from the spent fuel. This plutonium will be used to fuel India's prototype fast breeder reactor planned for Kalpakkam. Chidambaram says that reprocessing is "one of the most secretive operations in the nuclear world and a crucial part of the nuclear fuel cycle."

—"Third Reprocessing Plant Opened at Kalpakkam," *Nuclear News*, May 1996, p.43; "Third Reprocessing Plant Starts Up," *Nuclear Engineering International*, May 1996, p.8; "India Commissions Third Nuclear Fuel Reprocessing Plant," Deutsche Presse-Agentur, 27 March 1996; in Lexis-Nexis Academic Universe, 27 March 1996, <http://web.lexis-nexis.com>.

26 March 1996

In a first comprehensive assessment of India's nuclear safety, the Atomic Energy Regulatory Board (AERB) lists 120 potential safety-related problems in India's nuclear power stations. The report warns that several installations pose serious safety concerns especially the nuclear power stations in Chennai (Tamil Nadu) and Kota (Rajasthan), which have obsolete emergency core cooling systems, inadequate to handle the reactor core melt-down. The AERB report proposes the following measures to improve reactor safety: improved waste management systems, an assessment of reactor's earthquake survivability, and inspection and replacement of faulty pressure tubes.

—"Report: Indian Nuclear Plants Unsafe," United Press International, 26 March 1996; in Lexis-Nexis Academic Universe, 27 March 1996, <http://web.lexis-nexis.com>; "Report Lists 120 Safety-related problems in Indian Nuclear Plants," Deutsche Presse-Agentur, 26 March 1996; in Lexis-Nexis Academic Universe, 26 March 1996, <http://web.lexis-nexis.com>; "India Commissions Third Nuclear Fuel Reprocessing Plant," Deutsche Presse-Agentur, 27 March 1996; in Lexis-Nexis Academic Universe, 27 March 1996, <http://web.lexis-nexis.com>.

23 March 1996

Cold commissioning of the Kalpakkam Fuel Reprocessing Plant (KARP) is initiated. The new facility will enable the Department of Atomic Energy (DAE) to increase plutonium output from spent fuel. The plutonium will reportedly be used in India's Fast Reactor Program.

—Government of India, *Department of Atomic Energy Annual Report: 1996-1997*, p. 2:3.

12 March 1996

The turbine for the Fast Breeder Test Reactor (FBTR) is run for the first time after clearance from the Tamil Nadu

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Electricity Board. The FBTR runs continuously for 17 days at a power level of 10.5MWt.

—Government of India, *Department of Atomic Energy Annual Report: 1996-1997*, pp. 14-15.

Early March 1996

According to the sources at the Kurchatov Energy Institute in Moscow, officials from Russia, Iran, China, and India have signed a protocol to set up an Asian Fusion Research Foundation to further research in nuclear fusion energy. The final agreement will be prepared within several months and signed during the IAEA-sponsored conference in Montreal in August. According to Russian officials, the financing of the project was not discussed by the parties.

—"Russia, China, Iran, and India Agree to Fusion R&D Cooperation," *Nucleonics Week*, 21 March 1996, p. 15.

7 March 1996

A report from India's Standing Committee on Atomic Energy states that the status of the Rajasthan Atomic Power Station (RAPS) should be changed to a research and development project since the plant is a heavy financial burden on the Nuclear Power Corporation (NPC). The report states that RAPS-1 is "essentially an experimental station" and RAPS-2 also has "repeated and considerable technical difficulties and should provide an opportunity to our scientists and nuclear engineers to devise various indigenous alternatives and fabricate the needed machinery." Managing Director of the NPC, Y.S.R. Prasad, says the NPC's funds are barely enough to support current infrastructure and are insufficient for any expansion. He says the government should return to its policy of sharing half of the investment in nuclear power projects.

—"Committee Consider Indian Programme," *Nuclear Engineering International*, May 1996, p. 8; "India to Curtail Nuclear Activity," *United Press International*, 7 March 1996; in *Lexis-Nexis Academic Universe*, 8 March 1996, <http://web.lexis-nexis.com>.

Week of 26 February 1996

Speaking in parliament, Prime Minister Narasimha Rao says that both the NPT and the Comprehensive Test Ban Treaty (CTBT) are "defective" and "ineffective" and India is not going to give up its demand on making the CTBT conditional upon a specified timeframe for complete nuclear disarmament.

—Praful Bidwai, "Disarmament: India, Nonaligned Drift apart on Nuclear Ban," *Inter Press Service*, 8 March 1996; in *Lexis-Nexis Academic Universe*, 12 January 1996, www.lexis-nexis.com.

29 February 1996

In the budget for fiscal year 1996/97 presented to parliament by India's finance minister Manmohan Singh, the Department of Energy (DAE) gets 14.43 billion rupees (about \$418.26 million) up from 14.02 billion rupees for FY 1996/97. The Nuclear Power Corporation (NPC) gets 9.75 billion rupees (around \$282.68 million), down from 11.22 billion rupees in 1995-1996 and 1.5 billion rupees (\$43 million) less than it requested. The Bhabha Atomic Research Center (BARC) will receive 2.68 billion rupees, up from 2.66 billion rupees last year; the Indira Gandhi Center for Atomic Research (IGCAR) will receive 575 million rupees, while the Nuclear Fuels Complex (NFC) and Center for Advanced Computing will receive 293.2 million and 275 million rupees respectively.

—Neel Patri, "NPC Funding Continues to Drop as Indian Nuclear Revenues Lag," *Nucleonics Week*, 7 March 1996, pp. 17-18; Neel Patri, "Nuclear R&D Budget Rises Slightly in India for Coming Fiscal Year," *Nucleonics Week*, 14 March 1996, pp. 15-16.

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Mid-February 1996

Speaking at the "Nuclear Nonproliferation and the Millennium: Prospects and Initiatives" Conference sponsored by the Carnegie Endowment for International Peace, India's permanent Representative to the UN, Prakash Shah, asserts that India does not have any "hidden agenda" and does not intend to "sabotage" the Comprehensive Test Ban Treaty (CTBT). Former Indian Defense Minister K.C. Pant emphasizes that India is "the only country in history to incontrovertibly demonstrate its capability to explode a nuclear device and then withhold weaponization despite pressing security concerns and the continued proliferation of nuclear weapons across its frontiers and elsewhere in the world." Pant declares that "India's interests dictate that it be a part of global disarmament campaign, not of a disarmament charade." Jaswant Singh, a senior leader of the Bharatiya Janata Party (BJP), says his party believes India should openly declare itself a nuclear weapon state since it is much better to have an explicit rather than implicit program. According to Singh, India will appreciate if Pakistan decides to "follow a particular path of weaponization" to fulfill its security requirements. He acknowledges, however, that those embarking on weaponization, as well as the ones assisting them, will have to pay the price. He declared that countries in South Asia have their own national interests and asks the United States to "leave Asia alone" while at the same time working with it since "the next millennium really belongs to Asia."

—Aziz Haniffa, "Nuclear Pakistan No Problem for BJP Aide," *India Abroad*, 23 February 1996, p. 24; Aziz Haniffa, "Proliferation Fears Hover Over Conference," *India Abroad*, 23 February 1996, p. 22.

15 February 1996

Indian Ambassador to the Conference on Disarmament (CD) in Geneva, Arundhati Ghose, says the "lack of flexibility on the part of few delegations" to reach an agreement on broader talks on elimination of the nuclear weapons will affect India's stance on the Comprehensive Test Ban Treaty (CTBT). Ghose proposes an international convention to "codify the legal norm against the use of nuclear weapons." According to Ghose, a failure to link disarmament to the test ban treaty is "not only a matter of deep regret but of dismay."

—"India Renews Call for Talks on Nuclear Weapons Ban," Reuters, 15 February 1996; Compuserve-Executive News Service, 15 February 1996; "N-Test Ban Target Seen Threatened as Powers Scrap," 15 February 1996; in Compuserve-Executive News Service, 15 February 1996; "New Delhi Tries to Tie N-Test Ban in Knots," Financial Times, 16 February 1996, p. 4.

5 February 1996

A US State Department official says that US-India defense cooperation is limited by the international nonproliferation regimes and by related US export laws. He says the Indian government may have "unrealistic expectations" about the results of defense cooperation agreement (signed on January 1995).

—Teresa Hitchens and Vivek Raghuvanshi, "Nuke Policies Strain US-India Ties," *Defense News* (Springfield, VA), 12 February 1996, pp. 3, 36.

3 February 1996

Bhabha Atomic Research Center (BARC) Director A.N. Prasad says India's Department of Atomic Energy (DAE) "has achieved self-sufficiency" in meeting India's demand for heavy water and now can export the surplus to countries like South Korea, China, Romania, and Argentina.

—"India to Sell Heavy Water," United Press International, 3 February 1996; in Lexis-Nexis Academic Universe, 12

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January 1996, <http://web.lexis-nexis.com>; "India Has 100 Tons of Heavy Water for Export," Deutsche-Press-Agentur, 21 February 1996; in Lexis-Nexis Academic Universe, 21 February 1996, <http://web.lexis-nexis.com>.

2 February 1996

Jasjit Singh, director of the New Delhi-based Institute of Defense Studies and Analyses (IDSA) says that Indo-US defense cooperation will be limited as long as the United States continues to treat India as a major proliferation threat.

—Teresa Hitchens and Vivek Raghuvanshi, "Nuke Policies Strain US-India Ties," *Defense News*, 12 February 1996, pp. 3, 36.

January-February 1996

The Jaduguda-based mill of India's Uranium Corporation is expanding its capacity from 1,350 tons to 2,100 tons of uranium ore per day to process additional uranium ore of 1,000 tons per day produced by the recently commissioned Narwa Pahar mine. The resulting yellow cake will be sent to the Nuclear Fuels Complex (NFC) in Hyderabad for further processing before it is used in nuclear power reactors.

—"India: Television Details Steps to Boost Uranium Production," Delhi Doordarshan Television Network, 4 February 1996; in FBIS Document FBIS-NES-96-003, 4 February 1996.

January 1996

Officials from Uranium Corporation of India, along with police officers, destroy the village of Chatijkocha to construct a pond for storing depleted uranium from Jaduguda, India's primary uranium mine (Singhbhum East District of Jharkhand, 25km from the city of Jamshedpur). The uranium ore is milled and then transported to the Nuclear Fuels Complex (NFC) in Hyderabad to be fabricated into fuel rods. The uranium mines in Jaduguda, Batin, and Narwapahar are owned by the Uranium Corporation of India, which is regulated by India's Department of Atomic Energy (DAE).

—Xavier Dias, "Chatijkocha...Another Story," Unpublished report, Chaibasa, India, Mining Concerns Desk, Bindrai Institute for Research Study and Action, 12 February 1996.

27 January 1996

Brazilian President Fernando Henrique Cardoso and Indian Prime Minister Narasimha Rao sign a joint declaration where the two sides express their willingness to work on the Comprehensive Test Ban Treaty (CTBT) to eliminate all the "loopholes through which nuclearized states may continue to develop and refine their arsenals." The National Nuclear Energy Commission (CNEN) of Brazil and India's Atomic Energy Commission (AEC) sign a memorandum of understanding on cooperation in the field of nuclear energy in the areas of "research on the use of thorium as a fuel, nuclear safety, radiological protection, nuclear medicine, sterilization of food, and the use of nuclear techniques in agriculture and manufacturing heavy equipment."

—"Rao, Brazil's Cardoso Sign Joint Declaration, Accords," *Agencia Estado* (Sao Paulo), 27 January 1996; in FBIS Document FBIS-NES-96-021, 27 January 1996; "Brazilian President Departs Delhi; Nuclear Research Pact Signed," Delhi All India Network, 27 January 1996; in FBIS Document FBIS-NES-96-021, 27 January 1996.

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Later in 1996

Indian Ambassador to the Conference on Disarmament, Arundhati Ghose, meets scientists at the Bhabha Atomic Research Center (BARC), Trombay who are opposed to the Comprehensive Test Ban Treaty (CTBT). The scientists argue that a CTBT would prohibit them from testing their nuclear weapon designs and hurt India's nuclear weaponization program.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 387-388.

25 January 1996

Addressing the plenary session of the Conference on Disarmament (CD), India's Ambassador to the United Nations in Geneva, Ms. Arundhati Ghose, says India believes that the Comprehensive Test Ban Treaty (CTBT) "should be securely anchored in the global disarmament context and be linked through the treaty language to the elimination of all nuclear weapons in a time-bound framework." She remarks that the negotiating parties must "ensure that the CTBT leaves no loophole for activity, either explosive based or non-explosive based, aimed at the continued development and refinement of nuclear weapons." Having presented India's position on the issue, the Indian side "would be willing to examine any other language, which addresses [India's] concerns," she adds.

—Statement by Ms. Arundhati Ghose in the Plenary of the Conference on Disarmament, 25 January 1996; Embassy of India, Washington, DC, www.indianembassy.org.

25 January 1996

Addressing Congress party workers at a public rally at Nagarjunasagar (Andhra Pradesh), India's Prime Minister Narasimha Rao declares that India will not give up its nuclear option. Rao states that India is against an arms race on the subcontinent; however "in whatever manner" conceivable, India is not behind Pakistan.

—"Indian Prime Minister rules Out Abandoning 'Nuclear Option'," Delhi All India Radio Network, 25 January 1996; in FBIS Document FBIS-NES-96-018, 25 January 1995; "India Not to Forsake Its Nuclear Option, Says Premier Rao," Deutsche-Press Agentur, 25 January 1996; in Lexis-Nexis Academic Universe, 12 January 1996, <http://web.lexis-nexis.com>.

23 January 1996

Ambassador Ronaldo Sardemberg, presidential secretary for strategic affairs in Brazil, publicly states that Brazil may sign a memorandum of understanding with India "to obtain the necessary know-how to exploit thorium reserves." According to Sardemberg, the talks with India "do not involve an exchange of sensitive materials or uranium reprocessing and Brazil will not violate its commitments to the IAEA.

—"Brazilian Official Views Nuclear Talks with India," *Gazeta Mercantil* (Sao Paulo), 24 January 1996; in FBIS Document FBIS-NES-96-018, 24 January 1996.

20 January 1996

Brazil's President Fernando Henrique Cardoso confirms that Brazil is going to sign an agreement with India on the use of thorium for "purely scientific" purposes. He says there will be "no nuclear agreement."

—"Brazilian-Indian Thorium Deal Termed 'Purely Scientific'," *Agencia Estado* (Sao Paulo), 21 January 1996; in FBIS

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Document FBIS-NES-96-015, 21 January 1996; "Brazilian Official Views Nuclear Talks with India," *Gazeta Mercantil* (Sao Paulo), 24 January 1996; in FBIS Document FBIS-NES-96-018, 24 January 1996.

19 January 1996

India's External Affairs Minister Pranab Mukherjee says that India's nuclear program is for peaceful purposes and the reports suggesting otherwise are merely trying to "attack India on nonexistent issues."

—"External Affairs Minister on Nuclear Programme," BBC Summary of World Broadcasts, 20 January 1996; in Lexis-Nexis Academic Universe, 8 June 1996, <http://web.lexis-nexis.com>.

19 January 1996

John Holum, director of the US Arms Control and Disarmament Agency, says the United States accepts India's assurances and assumes that India is not going to test a nuclear device. Holum says Indian diplomats assured their American counterparts in Geneva where talks on a test ban treaty are under way that India is not planning to test nuclear weapons.

—"US Accepts India Will Not Test N-Weapon," Reuters, 19 January 1996; in Compuserve-Executive News Service, 19 January 1996; Sid Balman Jr., "India Assures US on Nuke Test," Reuters, 19 January 1996; in Compuserve-Executive News Service, 19 January 1996.

Mid-January 1996

US Ambassador to India Frank Wisner urges India not to develop nuclear weapons because it would exacerbate regional tensions rather than enhance national security, as well as trigger a nearly complete cut-off of financial assistance from the United States.

—"US Accepts India Will Not Test N-Weapon," Reuters, 19 January 1996; in Compuserve-Executive News Service, 19 January 1996; Sid Balman Jr., "India Assures US on Nuke Test," Reuters, 19 January 1996; in Compuserve-Executive News Service, 19 January 1996.

11 January 1996

Speaking to the press in New Delhi, Canadian Prime Minister Jean Cretien says he hopes "India would find a way out to accept the nuclear nonproliferation treaty." He adds that he expects that "some more progress would be made on the issue during the visit" since for Canada it is important to improve relations with India.

—"Canada Tells India: Sign Nuclear Treaty," United Press International, 11 January 1996; in Lexis-Nexis Academic Universe, 12 January 1996, <http://web.lexis-nexis.com>.

1 January 1996

India and Pakistan exchange the lists of their nuclear installations under the Agreement on Prohibition of Attack against Nuclear Facilities signed in 1988.

—"India, Pakistan: Strany obmenyalis spiskami raspolozhennykh na territoriyakh dvukh gosudarstv yadernykh ob'yektov," Info-Tass, 2 January 1996; in *Bulleten Tsentra Obshchestvennoy Informatsii po Atomnoy Energii*, No. 4-5, 1996, p. 77.

1996

In view of mounting pressure from the Indian army to embark on a policy of nuclear weaponization, Prime Minister

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Narasimha Rao permits "Chiefs of Staff" targets to be assigned to the Army's Prithvi-1 (150km-range/1,000kg payload) ballistic missiles. The "Chiefs of Staff" targeting plan is analogous to the US Single Integrated Operational Plan (SIOP). The Prithvi targets range from 'point targets' such as Ichiigoil Canal, to "high-value" targets such as oil refineries and nuclear installations. This marks a critical threshold in the operationalization of India's nuclear deterrent against Pakistan. The weapons in India's inventory include 20-100kt nuclear warheads and gravity bombs weighing 200-300kg. Tritium boosted fission weapons are also available. Despite the absence of field tests, the Bhabha Atomic Research Center has high confidence in the reliability of its weapon designs.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 376.

1996

The Nuclear Fuel Complex (NFC) signs a deal with the US company Western Zirconium to supply 40MT of zirconium oxide. NFC also sells 1,805kg of Zircaloy-4 bars worth \$157,347 to the Korea Nuclear Company.

— Government of India, *Department of Atomic Energy Annual Report: 1996-1997*, p. 2:3.

1996

The new uranium fuel assembly plant is inaugurated in Hyderabad. The Nuclear Fuel Complex (NFC) claims that 95 percent of the production and quality control equipment are indigenous.

—Government of India, *Department of Atomic Energy Annual Report: 1996-1997*, pp. 3:9-3:10.

1996

India's Tarapur nuclear power plant, which houses two boiling water reactors (BWRs), is encountering severe problems due to repeated shutdowns and a lack of spare parts. To remain in operation, Tarapur requires \$200 million in equipment, including secondary steam generator replacements, recirculation pump components, instruments for monitoring core safety, control-rod drive components, and turbo generator components. Although General Electric (GE) of the United States has a monopoly in the manufacture of most of these spare parts, it no longer produces the equipment because BWR technology is out-of-date. India does not have the technical drawings necessary to indigenously produce the equipment, and it is unlikely that GE will provide them. Since 1974, when India conducted a nuclear test at Pokhran, nearly all the equipment for the Indian plant was bought from German, Spanish, Swedish, and other European firms.

—Sumit Ghoshal, "Tarapur N-Unit Faces Crisis over Spares," *Indian Express* (Mumbai), 29 September 1996, www.expressindia.com.

1996

Indian press reports suggest that Mazagon Dock Limited (MDL), an Indian government owned defense public sector company, has the expertise and relevant facilities for building nuclear-powered submarines. However, the facilities are not utilized since the Indian Navy does not have enough resources to place orders.

—Huma Siddiqui, "Rs 15,000 Crore Needed to Strengthen Navy: Report," *Financial Express* (Mumbai), 7 September 1996, www.expressindia.com.

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1996

According to the US Central Intelligence Agency India seeks nuclear-related items "some of which may have been intended for its nuclear weapons program."

—"The Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions," Director of Central Intelligence, Biannual Report to Congress, July-December 1996.

1996

The Indian Institute of Science, Bangalore purchases a supercomputer from the US company Digital Equipment Corp. [Note: IBM spokesperson Fred McNeese says that in April 1994, IBM installed a supercomputer at the Institute's Supercomputing Education and Research Center. The installed machine is capable of performing 1.4 billion operations per second.]

—Gary Milholin, "Made in America?" *Washington Post*, 8 June 1998, p. C1.

1996

The Center for Advanced Computing (C-DAC), Pune, develops the Param Opus supercomputer, a prototype of the proposed Teraflop (floating point instruction per second) which C-DAC intends to develop by 1998. The Teraflop computer will be capable of processing one trillion operations per second and will have the applications ranging from advanced weather forecasting to nuclear power generation.

—Srinivas Venugopal, "India: Supercomputer Development Set to Enter 'Next Phase'," *Business Standard* (New Delhi), 9 May 1996; in FBIS Document FBIS-NES-96-094, 9 May 1996.

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1995**Mid-1990s**

Scientists at the Bhabha Atomic Research Center (BARC) encounter design problems with the reactor built for the Advanced Technology Vessel (ATV); the reactor has problems functioning at variable planes. The slow progress on the reactor design leads to tensions between BARC and the Indian Navy (IN). In order to meet its internal deadline of acquiring a nuclear submarine by the year 2000, the IN proposes that BARC build a reactor to Russian specifications with Russian assistance. As part of the resulting trade-off, the IN expresses willingness to treat the entire reactor unit as a "black box" that would periodically be sent to Russia for servicing and fuel loading. However, BARC opposes the IN's proposal on grounds that it would compromise India's independence and make the country dependent on a foreign supplier. Senior scientists from the nuclear establishment also doubt the IN's commitment to the ATV project citing the lack of continuity in the officers' team assigned to the project and their impatience. BARC scientists allege that Russia is playing an insidious role by sowing seeds of doubt about the Indian reactor design in the minds of senior IN officials; with the latter insisting that Russian scientists and engineers certify each of the ATV's indigenously designed sub-systems and assemblies.

—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), pp. 656-657.

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Mid-1990s

The Advanced Technology Vessel (ATV) or nuclear submarine suffers delays as Russian technical assistance to India falters. Russian officials decline to transfer blueprints of the actual reactor design out of fear of alienating the United States. However, Indian designers and engineers are allowed to visit Russian design bureaus in Leningrad, and are shown the equipment they wish to see, and allowed to take notes.

—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), p. 656.

1995-1996

The Tuticorin Heavy Water Plant is shut down for more than four months due to a faulty super heater coil.

—Government of India, *Department of Atomic Energy Annual Report: 1995-1996*, p. 16.

December 1995-January 1996

Ambassador Arundhati Ghose and a Ministry of External Affairs (MEA) team comprising Rakesh Sood and Kamlesh Sharma travel to the Indira Gandhi Center for Atomic Research, Kalpakkam to seek technical clarifications on the Comprehensive Test Ban Treaty (CTBT). The clarifications sought by the MEA team are mainly related to issues concerning verification, and "sub-critical" testing. Based on the advice rendered by the Department of Atomic Energy (DAE) led by Dr. R. Chidambaram, the Indian negotiating team proposes amendments to the CTBT draft. However, differences emerge between the DAE and MEA on negotiating tactics at Geneva. The MEA believes that India should adopt a principled stand on the CTBT, whereas the amendments suggested by the DAE are essentially "spoilers" aimed at delaying negotiations on the treaty.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 384-387.

1995

The Chairman of India's Atomic Energy Commission (AEC) Dr. R. Chidambaram allegedly advises the Indian Comprehensive Test Ban Treaty (CTBT) negotiating team in Geneva that India has the technological expertise and capability to conduct "sub-criticals" such as "hydrodynamic" and "hydronuclear" tests.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 382.

1995

Nuclear scientists and engineers at the Bhabha Atomic Research Center (BARC) continue working on designs of deliverable fission, boosted-fission, and thermonuclear weapons. The scientists make the case for nuclear tests on three grounds: tests are needed to validate the weapon designs; tests are required to recruit and retain talented scientists and engineers who otherwise might be lured by career alternatives; and finally, tests will raise the morale of the nation and help recruit future scientists to replace the team that designed and tested the nuclear device in 1974.

—George Perkovich, "India Verges on Tests," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), pp. 364-365.

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December 1995

A Defense Research and Development Organization (DRDO) official says the nuclear power plant for India's Advance Technology Vessel (ATV) was developed by the Bhabha Atomic Research Center (BARC) and is currently being assembled at Kalpakkam. He says the land testing will begin within two-three months. The official adds that the submarine program is still five years and 25 billion rupees away from completion. According to DRDO scientists, the ATV will be eventually equipped with 1,000km-range missiles. A DRDO official adds that the main problem with India's ATV project "relates to the sub-surface technology of the missile system." The sound navigation and radiation (Sonar) equipment is under development at Cochin and Hyderabad, respectively. [Note: India's ATV project was conceived in 1970s but was cleared by the government only in the mid-1980s. In 1995 the DRDO produced titanium-steel Pre-Test Capsule (PTC) that is currently located about 60 km south of Chennai.] —"Submarine N-Power Plant Getting Ready," *Times of India* (Mumbai), 29 December 1995; in *Strategic Digest*, March 1996, pp. 440-441.

28 December 1995

The *Indian Express* reports that pressure is mounting on India's Prime Minister to declare India a nuclear weapon state at the forthcoming session of the Conference on Disarmament (CD) in Geneva without nuclear testing. The newspaper states that during the meetings over the past several months, the prime minister's office, defense and nuclear establishments, and ministries of external affairs and defense agreed on the "middle line" for India: "abjuring a test, yet claiming nuclear weapon status." They also agreed that after the indefinite extension of the NPT, the policy of "keeping the nuclear option open" is redundant unless it can be turned into effective deterrence to protect India's interests in both diplomatic and military terms; that both the Comprehensive Test Ban Treaty (CTBT) and the Fissile Materials Cut Off Treaty (FMCT) "have been made untenable," thus requiring a review of India's nuclear policy. Citing a government official, a report states that "if an underground shaft used for lowering a nuclear weapon is being cleaned out or new wiring is being done at the site, it does not mean that a bomb is about to be tested." According to the report, India's strategic and defense community agrees that it is important that India possesses delivery systems and other relevant infrastructure if it wants the nuclear weapon states to take its posture of keeping the option open seriously.

—K.P. Nayar, "Rao Under 'Pressure' to Declare Nation Nuclear Power," *Indian Express* (Mumbai), 28 December 1995, p. 1; in FBIS Document FBIS-NES-95-250, 28 December 1995.

Late December 1995

A few members of parliament move a private bill proposing that both houses pass a "unanimous resolution stating that India should not sign the CTBT [Comprehensive Test Ban Treaty] unless the nuclear powers agreed to work towards the total elimination of their nuclear weapons." Bharatiya Janata Party (BJP) parliamentarian Jaswant Singh, who is one of the bill's proponents, says that India must realize that the CTBT "hurts India's national interests more than it does that of the others. The challenge is to balance vital national interests with valid international concerns about proliferation." The director of the Defense Research and Development Organization (DRDO) Dr. A.P.J. Abdul Kalam says that while India should support the CTBT, it should "negotiate from a position of strength."

—Raj Chengappa, "Testing Times," *India Today*, 31 December 1995, pp. 46-51.

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23 December 1995

Dismissing Pakistan's statement on reports that India was preparing for a nuclear test, a spokesperson of the Ministry of External Affairs says this is a familiar example of Pakistan's anti-India propaganda. He says Pakistan's statement aims to divert the attention of the international community from Pakistan's nuclear weapons program. According to the spokesperson, Pakistan's nuclear program poses a real threat to peace and stability in South Asia and the world.

—"Pakistani Nuclear Program Said Posing Threat," All India Radio Network (New Delhi), 23 December 1995; in FBIS Document FTS19951223000155, 23 December 1995.

22 December 1995

India's Parliamentary Standing Committee on Energy demands a review of the country's nuclear policy given the reduction in financial and political support for the program over the last decade. Initially, the nuclear program aimed to produce 10,000MW of nuclear energy by the turn of the century, and then the target was changed to 5,700MW and later to 3,200MW of nuclear energy to be attained by 2004. The committee's report states that the uranium mining, fuel fabrication, reprocessing, waste management and heavy water production facilities will be "grossly underused" as a result. The financial support from the government for the nuclear power projects has reduced significantly: instead of planned 144 billion rupees proposed for the eighth plan, the government allotted only 6 billion rupees. The revenues of the government-owned Nuclear Power Corporation (NPC) are insufficient to fund new projects and it has no access to overseas funds.

—"Dismay' Over Indian Program," *Nuclear Engineering International*, February 1996, p. 9.

20 December 1995

In a written reply to India's upper house of parliament (Rajya Sabha), India's Minister of External Affairs Pranab Mukherjee says that the government is constantly reviewing India's security situation in view of Pakistan's clandestine nuclear weapons program. Mukherjee asserts that the government will take adequate steps to meet any threat to India's security.

—"Mukherjee Calls Nuclear Program 'Peaceful' Pakistan Called 'Weapons-Oriented'," All India Radio Network (New Delhi), 20 December 1995; in FBIS Document FTS19951220000586, 20 December 1995.

19 December 1995

In a written reply to the Lok Sabha (India's lower house of parliament), India's Minister of State for External Affairs R.L. Bhatia says India's stance on the NPT issue "enjoys national consensus." He states that New Delhi is opposed to the NPT because of its discriminatory character. He adds that India remains committed to the goal of nonproliferation through elimination of nuclear weapons in a time-bound framework. He says the government monitors the security situation and will take all necessary steps to meet any security threat.

—"Official Reiterates 'Peaceful' Nature of Nuclear Program," All India Radio Network (New Delhi), 19 December 1995; in FBIS Document FTS19951219000609, 19 December 1995.

19 December 1995

India's Minister of External Affairs Pranab Mukherjee denies that India had plans to carry out a nuclear explosion. He dismisses the *New York Times* report as "speculative and baseless." According to Mukherjee, India "deliberately

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opted not to manufacture nuclear weapons" since its nuclear program is "for peaceful purposes." Mukherjee denies that the United States has pressured India to sign the Comprehensive Test Ban Treaty (CTBT). He adds that India will continue to participate in the treaty negotiations at the Conference on Disarmament.

—"Mukherjee Calls Nuclear Program 'Peaceful'," Hindustan Times (New Delhi), 19 December 1995; in FBIS Document FTS19951219000682, 19 December 1995; "Foreign Minister Denies Nuclear Test Plans," AFP (Hong Kong), 19 December 1995; in FBIS Document FBIS-NES-95-243, 19 December 1995; "India Says No Plans to Conduct New Nuclear Test," Deutsche Presse-Agentur, 19 December 1995; in Lexis-Nexis Academic Universe, 19 December 1995, <http://web.lexis-nexis.com>.

18 December 1995

Addressing reporters in New Delhi, the ruling Congress spokesperson V.N. Gadgil says the government will not succumb to external pressure on the issue of India's nuclear policy.

—"Congress-I rejects 'External Pressure' on Nuclear Program," Doordarshan Television Network (New Delhi), 18 December 1995; in FBIS Document FTS19951218000448, 18 December 1995.

18 December 1995

In a press release, senior Bharatiya Janata Party (BJP) leader Atal Bihari Vajpayee says the recent *New York Times* report that accuses India of an attempt to conduct a nuclear test "is deliberately planted by the US government." Vajpayee urges the Indian government not to succumb to external pressure in matters of national security.

—"Nuclear Test Report 'Deliberately' Planted by US," All India Radio Network (New Delhi), 18 December 1995; in FBIS Document FTS19951218000449, 18 December 1995.

18 December 1995

Citing the studies from the Stockholm International Peace Research Institute, India's Minister of State for External Affairs R.L. Bhatia says that Pakistan has enough nuclear material to produce 20 nuclear devices and that India will have to take necessary steps to cope with this security threat.

—"India: Pakistan Has Nuclear Material," United Press International, 18 December 1995; in Lexis-Nexis Academic Universe, 19 December 1995, <http://web.lexis-nexis.com>.

17 December 1995

The Bharatiya Janata Party (BJP) says the US warning against India's attempt to carry out nuclear tests is a "ploy to coerce India into accepting the CTBT [Comprehensive Test Ban Treaty]." The Janata Dal party says India should not sign the CTBT since it is "a question of national security on which there must be no pressure." The leader of India's Communist Party (Marxist) Prakash Karat adds that the government must resist pressure to sign the CTBT.

—"Opposition Flays US for Comments on Reports of Indian Nuke Test Plan," Agence France Presse, 17 December 1995; in Lexis-Nexis Academic Universe, 17 December 1995, <http://web.lexis-nexis.com>.

15-16 December 1995

The *New York Times* reveals that over recent weeks, US spy satellites have "recorded a flurry of scientific and technical activity at the Pokhran test site in the Rajasthan desert in India." The report notes, however, that the US intelligence experts have not been able to determine whether the activity recorded related to the test

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preparations or "some other experiment to increase India's expertise in making nuclear weapons." Citing a US official, the *Washington Post* notes that "the efforts to clean out a deep underground shaft for lowering a nuclear weapon into the earth" and "possible preparations for instrumentation" of the nuclear test were detected. The reports state that the United States "is working to discourage" India from testing in order to prevent a "snowball effect." White House spokesperson Michael McCurry says India's testing would jeopardize the Comprehensive Test Ban Treaty (CTBT) negotiations. The government of India denies the allegation, stating that the activity involved was a "routine" military exercise. An Indian Ministry of External Affairs (MEA) spokesperson says that while India has "the capability," it has not utilized it since it believes "in the peaceful uses of nuclear energy and not for weapons purposes." He adds that the satellites detected military exercises conducted in the area on a regular basis.

—Tim Weiner, "US Suspects India Prepares for Nuclear Test," *New York Times*, 15 December 1995, p. A6; Sridhar Krishnaswami, "US Warns India on N-Test 'Plan'," *Hindu* (Chennai), 23 December 1995, p. 3; "India and Nuclear Testing," *Trust and Verify*, No. 63, January 1996, p. 1; "India Suspected of Preparing for Nuclear Test," *Arms Control Today*, December 1995-January 1996, p. 28; R. Jeffrey Smith, "Possible Nuclear Arms Test by India Concerns US," *Washington Post*, 16 December 1995, p. A17; John F. Burns, "India Denies Atom-Test Plan but Then Turns Ambiguous," *New York Times*, 16 December 1996, p. 4; "India Calls Nuclear Test Report 'Speculative'," Reuters, 15 December 1995; in Executive News Service, 15 December 1995; "Nuclear Test Report Called Speculative," *Washington Times*, 16 December 1995, p. A9; "Spokesman Denies Plans for Nuclear Test," ISI Diplomatic Information Service (New Delhi), 15 December 1995; in FBIS Document FTS19951215000385, 15 December 1995.

6 December 1995

Addressing the Rajya Sabha (upper house of parliament), Minister of External Affairs Pranab Mukherjee says the recent nuclear tests by France and China present a serious setback to the ongoing negotiations of the Comprehensive Test Ban Treaty (CTBT).

—"Nuclear Tests by France, PRC Cause 'Dismay'," All India Radio Network (New Delhi), 6 December 1995; in FBIS Document FTS19951206000111, 6 December 1995.

5-7 December 1995

Marketing and Research Group (MARG) carries out an opinion poll, testing the attitudes of India's urban elites towards various issues pertaining to India's nuclear weapons program. The survey is carried out in nine cities: Mumbai, New Delhi, Calcutta, Bangalore, Hyderabad, Lucknow, Ahmedabad, and Patna and encompasses 2,000 respondents. Thirty-eight percent of them rate the nuclear issue as "very important" among a range of other concerns. Sixty-two percent say they would approve if India was to explode "an atom bomb" to develop its nuclear weapon capabilities. Fifty-four percent say they would approve such move even if it entailed economic sanctions from the United States and Japan, affecting India's economic growth. Sixty-eight percent answer "yes" to the question whether India should "give up the option of making atom bombs only if other nuclear powers agree to do the same." Forty-three percent of respondents say they would be "more inclined to support the party" that would say it will "certainly ensure India will have nuclear weapons," while for 31 percent, it makes no difference and 26 percent say they would be less inclined to support such political party.

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—"Yes to the Bomb," *India Today*, 31 December 1995, p. 48; "Majority Favor Country Going Nuclear: Poll," *Hindu* (Chennai), 17 December 1995.

3 December 1995

Mulayam Singh Yadav, a leader of Samajwadi (socialist) Party says India should not manufacture nuclear weapons to avoid an arms race. He says that resources should rather be allocated for the improvement of the wellbeing of the Indian people.

—"Party Head Urges Government Not to Make N-Bomb," *Varanasi Aj* (Varanasi), 3 December 1995, p. 5; in FBIS Document FBIS-NES-95-247, 3 December 1995.

December 1995

Senior Russian officials say the construction of the two VVER-1,000 reactors will not begin until India proves it has sufficient resources for project completion. According to Russian officials, India does not want a turnkey plant construction anymore and wants to have an agreement, similar to the one Russia had with China (when Russia supplied engineering and hardware for the two VVER reactors, which were built largely by Chinese contractors). Russian officials say that Minatom has not initiated the change of an agreement with India so far. According to an official from Zarubezhatomenergostroy (a branch of Minatom, responsible for foreign nuclear plant contracts), the financing issue is critical and the interest rate India is seeking is not acceptable to Russia. He also says that India wants to finance a part of the project in barter trade. Project officials say that some modifications would have to be done to the reactors given the tropical climate and the changes will affect the layout of the safety-related systems and equipment, in particular the design of the coolant system.

—Mark Hibbs, "India Seeks China-Style Deal for Two VVERs, Minatom Says," *Nucleonics Week*, 11 January 1996.

August-December 1995

Prime Minister P.V. Narasimha Rao begins an internal debate within the government over whether India should conduct additional nuclear tests. The Indian cabinet is divided on the issue; some cabinet ministers support a program of tests; others such as finance minister Manmohan Singh oppose the tests on grounds that US sanctions will disrupt India's economic recovery. Some of Rao's advisors believe that tests should be preceded by preparations to ride out US sanctions for a period of at least two years. However, the Chief Scientific Advisor, Dr. A.P.J. Abdul Kalam and the Chairman of the Atomic Energy Commission Dr. R. Chidambaram, argue in favor of tests. Rao orders Kalam and Chidambaram to make preparations so that tests can be conducted within 10 days of political authorization. Ultimately, however, Rao decides to defer the tests until later.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), pp. 392-395.

November-December 1995

The compressed enriched uranium water reactor for India's Advanced Technology Vessel (ATV) or nuclear submarine project fails a series of tests carried out at Kalpakkam.

—Vivek Raghuvanshi, "Technical Snags Frustrate Indian Nuclear Sub Program," *Defense News* (Springfield, VA), 24-30 June 1996, p. 40.

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28 November 1995

Bhabha Atomic Research Center (BARC) director A.N. Prasad says the government has decided to set up an experimental Kamini nuclear reactor at the Kalpakkam Atomic Power Station. The planned reactor could generate 30KW of electricity. Prasad adds that U-233, extracted from thorium, will be used to fuel this reactor.

—"Thorium-Based Nuclear Unit Planned for Madras," *Dinamalar* (Chennai), 28 November 1995; in FBIS Document FTS19951128000077, 28 November 1995.

18 November 1995

Senior Bharatiya Janata Party (BJP) leader Atal Bihari Vajpayee says India should declare itself a nuclear weapon state in response to recent US efforts to have India sign the NPT. Vajpayee remarks that there can hardly be "a general agreement on nuclear disarmament since the US administration wants some countries to strengthen their nuclear arsenals."

—"Right-Wing Leader for a Nuclear India," United Press International, 18 November 1995; in Lexis-Nexis Academic Universe, 19 November 1995, <http://web.lexis-nexis.com>.

11 November 1995

Embarking on a new election campaign, Bharatiya Janata Party (BJP) senior leader Murli Manohar Joshi asserts that his party will build a nuclear deterrent against Pakistan and China if voted to power in 1996.

—Madhu Nainan, "India's Main Opposition Party Vows to Build Nuclear Arsenal if Elected," Agence France Presse, 11 November 1995; in Lexis-Nexis Academic Universe, 13 November 1995, <http://web.lexis-nexis.com>.

30 October 1995

The Bharatiya Janata Party (BJP) issues a four-page "Agenda for the Future," in which it outlines its foreign policy perspective. The document states that the image of "managed and maneuvered" India should be changed. The party reiterates that India must exercise its nuclear option and take the necessary steps for testing a nuclear device.

—"India Must Test Nuclear," *Asian Age*, 31 October 1995; in *Strategic Digest*, February 1996, p. 265.

27 October 1995

Addressing a UN committee, a senior Bharatiya Janata Party (BJP) leader Atal Bihari Vajpayee urges nuclear weapon states to eliminate their arsenals in a time-bound and phased manner. He adds that the recent nuclear tests by some nuclear weapon states have further compounded the problem of nuclear nonproliferation.

—"UN Envoy Urges Phased Elimination of Nuclear Arms," All India Radio Network (New Delhi), 27 October 1995; in FBIS Document FTS19951027000249, 27 October 1995.

24 October 1995

Speaking at the Special Commemorative Meeting of the 50th session of the United Nations General Assembly (UNGA), India's Prime Minister Narasimha Rao says the world, bristling with nuclear weapons, cannot be secure. Rao maintains that "deterrence is a false belief" since the possession of nuclear weapons by some countries prompts other countries to acquire them as well, thus leading to nuclear proliferation "which is impossible to police for all time." According to Rao, the idea of a permanent number of nuclear weapon states is "unrealistic and

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self-defeating." Rao appeals to the UN General Assembly to "take credible steps for the complete elimination of all nuclear weapons within a stipulated time frame" and notes that the Action Plan suggested by India in 1988 can be an "appropriate starting point."

—Speech by Mr. P.V. Narasimha Rao, Special Commemorative Meeting, UNGA 50th session, 24 October 1995; Ministry of External Affairs, Government of India, www.meadev.nic.in.

19 October 1995

Addressing the XI Nonaligned Summit at Cartagena, Colombo, India's Prime Minister Narasimha Rao urges the nonaligned countries to support India's position on disarmament. He asks, "If such a commitment [on universal nuclear disarmament] is not forthcoming, what are we to make of a status in which a few hold on to their awesome arsenals, kept trim by sophisticated computer simulation techniques, while they want all others to watch on with empty hands?"

—Raj Chengappa, "Testing Times," *India Today*, 31 December 1995, pp. 46-51.

15 October 1995

The Press Trust of India reports that India's Department of Atomic Energy (DAE) and the Nuclear Power Corporation (NPC) are planning to reach 20,000MW of nuclear energy production within two decades by means of using new plutonium-rich carbide fuel - "plutonium-uranium monocarbide."

—"India to Increase its Nuclear Capacity," United Press of India (New Delhi), 15 October 1995; in Executive News Service, 16 October 1995.

13 October 1995

Addressing the XI Nonaligned Summit at Cartagena, Colombo, India's Minister of External Affairs Pranab Mukherjee says that India does not support the US position that resumption of military supplies to Pakistan will not enhance the latter's striking capacity. He asserts that the threat perception following the arms transfer is real and not over-exaggerated. Mukherjee says that India has to step up its defense expenditure to meet the threat. Mukherjee adds that even if the Comprehensive Test Ban Treaty (CTBT) is signed in 1996, nuclear proliferation can nevertheless continue.

—"Mukherjee Comments on US Arms, Nuclear, UN Issues," All India Radio Network, 13 October 1995; in FBIS Document FTS19951013000026, 13 October 1995.

7 October 1995

A spokesperson for India's Ministry of External Affairs issues a denial that Prime Minister Narasimha Rao agreed to participate in the proposed five-nation conference on nuclear nonproliferation in South Asia during his meeting with US Senators Hank Brown and Arlen Specter.

—"Report on Rao Statement to US Officials Denied," All India Radio Network (New Delhi), 7 October 1995; in FBIS Document FTS19951007000159, 7 October 1995.

October 1995

Prime Minister Narasimha Rao attempts to coordinate and harmonize the conflicting positions within Indian government on the Comprehensive Test Ban Treaty (CTBT) negotiations. Rao orders that Indian negotiators should

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explicitly link the CTBT to the objective of a nuclear-weapon-free world.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 381.

September 1995

During the 50th Session of the UNGA in New York, John Holum, Director of the US Arms Control and Disarmament Agency, requests a meeting with Indian Ambassador Arundhati Ghose. In the meeting, Holum allegedly describes India's nuclear weapon-related efforts a "pipe dream" and urges Ghose to join the United States in successfully negotiating a Comprehensive Test Ban Treaty (CTBT). Ghose informs Holum that India should not be expected to support another discriminatory treaty, similar to the NPT.

— Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 382-383.

29 September 1995

At the 12th Plenary Meeting of the 50th Session of the United Nations General Assembly (UNGA), India's Minister of External Affairs Pranab Mukherjee says that "the existence of nuclear weapons poses a threat to peace and security" and global nuclear disarmament is the only way to eliminate that threat." According to Mukherjee, the NPT is a "pernicious document" because it legitimizes the "illogic" of nuclear "haves" and "have nots." He adds that the proposed Comprehensive Test Ban Treaty (CTBT) must become "an integral step in the process of nuclear disarmament." The development of advanced warhead designs after the CTBT is signed will be "as contrary to the spirit of the CTBT as the NPT is to the spirit of nonproliferation," he says. Furthermore, Mukherjee notes that the CTBT "must contain a binding commitment on the international community, especially the nuclear weapon states, to take further measures within an agreed timeframe towards the creation of a nuclear weapon free world."

—Speech by Pranab Mukherjee, UNGA 50th Session, 12th Plenary Meeting, 29 September 1995; Ministry of External Affairs, Government of India, www.meadev.nic.in.

Mid-September 1995

Atomic Energy Commission (AEC) chairman R. Chidambaram tells *Nuclear Fuel* that "in coming weeks, Tarapur-2 will be reloaded with a core including more assemblies of mixed-oxide (MOX) fuel than the two MOX assemblies that were loaded last year at Tarapur-1." According to Chidambaram, the Tarapur reactors will be loaded with far less than maximum allowable 30 percent of MOX fuel. Under the trilateral agreement with the United States and the IAEA, India has notified both about its intentions. He adds that a "semi-commercial-scale reprocessing plant" under construction at Kalpakkam is "nearly completed" and all hot-cell equipment, produced by the Bhabha Atomic Research Center (BARC), has been installed. The plant will commence trial operations "in less than one year's time," he says. According to Chidambaram, the plant's capacity will allow India to separate enough plutonium within "several years" for a 500MW prototype fast breeder reactor (FBR), which the Department of Atomic Energy (DAE) intends to construct. The FBR itself can be produced within several years, Chidambaram says, even though it is still "at the proposal stage, and there has been no funding commitment thus far."

—Mark Hibbs, "Tarapur-2 to Join Twin BWR in Burning PHWR Plutonium," *Nuclear Fuel*, 25 September 1995, pp. 18-19.

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15 September 1995

India's Ministry of External Affairs regrets the nuclear tests carried out by France and China recently, calling the development "a serious setback to the ongoing negotiations for a comprehensive test ban treaty." The ministry's spokesperson says that the development highlights the "inherent defects" of the NPT. He expresses the hope that "all countries will negotiate in good faith for a universal and nondiscriminatory treaty and refrain from actions contrary to this objective."

—"Spokesman Expresses 'Dismay' over Nuclear Tests," All India Radio Network (New Delhi), 15 September 1995; in FBIS Document FTS19950915000299, 15 September 1995.

14 September 1995

In a testimony before the Senate Foreign Relations Subcommittee on Near-Eastern and South Asian Affairs, US Assistant Secretary of State Robin Raphel says any resumption of Russian exports of nuclear power reactors or missile-related equipment to India will be of concern to the Clinton administration.

—"Article Claims US Alarmed by Sale of Russian Reactors," *Hindu* (Chennai), 18 September 1995; in FBIS Document FTS19950918000021, 18 September 1995.

5 September 1995

Former Atomic Energy Commission (AEC) Chairman R. Srinivasan says India might end up producing only about 3,000-4,000MW of nuclear power by the turn of the century, which is about one-third of its initial target of 10,000MW. According to Srinivasan, the scarcity of resources allocated by the government and the delay in the clearance of 500MW reactors are the reasons for the program's slowdown. He mentions the case of Kaiga Atomic Power Project, where the dome collapsed in May 1994, and neither the Nuclear Power Corporation (NPC) nor the Department of Atomic Energy (DAE) provided clear reasons for the accident or said what needs to be done to get the project back on schedule. Speaking about the deal with Russia for two VVER-1,000 reactors for Koodankulam, Srinivasan says that while India should not scrap the agreement, it should explore other options for the supply of light water reactors from France or Germany. He adds that the deal with Russia is beneficial because it does not require India to join the NPT or accept the full-scope safeguards, while France began insisting on full-scope safeguards after it joined the NPT. Srinivasan says, however, that France might relent if "there is a good business proposition." Srinivasan believes that India should develop a fast breeder reactor program at some point. He maintains, however, that at present the efforts and resources should be concentrated on the consolidation of the heavy water reactor program and exploration of light water reactor projects.

—"AEC Chairman: India 'Must Push' Nuclear Program," *Business Line* (Chennai), 5 September 1995, p. 24; in FBIS Document FBIS-NES-95-005, 5 September 1995.

1 September 1995

The Kakrapar Atomic Power Station (KAPS) goes fully operational when its 220MWe Unit 2 reactor begins commercial power generation.

—Government of India, *Department of Atomic Energy Annual Report: 1995-1996*, p. 11.

September 1995

India's Nuclear Power Corporation (NPC) plans to raise one billion rupees through bonds in the capital markets for

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the second time in 1995. Earlier, the NPC raised two billion rupees through the same process. Overall, it needs seven billion rupees in 1995 to proceed with Kaiga (Karnataka) and Rawatbhata (Rajasthan) projects currently under construction.

—"India NPC Plans 1.0 bln Rupee Bonds at 16.25 Pct," Reuters, 18 September 1995; in Executive News Service, 18 September 1995.

September 1995

A Russian delegation visits India to discuss the Koodankulam nuclear power reactor deal. It is agreed that Russia will supply "most of the reactors' main components while the Indian side will carry out most of the construction work." It is not decided yet whether India will supply instrumentation for the reactors.

—"Russians Reconsider Koodankulam," *Nuclear Engineering International*, October 1995, p. 5.

August 1995

K. Santhanam, Chief Technical Advisor at Defense Research and Development Organization (DRDO), is appointed Mission Director for a possible round of nuclear tests in the Rajasthan desert.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 391.

28 August 1995

A spokesperson for India's Ministry of External Affairs denies that India is ready to participate in the proposed five-nation talks on nuclear nonproliferation in South Asia. He says these allegations are "a part of disinformation campaign [since] India has consistently opposed a regional approach for a solution to the nuclear proliferation issue and is in favor of global solution on a nondiscriminatory basis."

—"Official Denies Readiness to Join Nuclear Talks," AFP (Hong Kong), 28 August 1995; in FBIS Document FTS19950828000379, 28 August 1995.

6 August 1995

Financial Express (Mumbai) reports that the Nuclear Fuels Complex (NFC) plans to commission three plants—uranium oxide fuel, uranium fuel assembly, and zircaloy fuel fabrication plants—at Moulali in December this year. According to the report, the plants have been completed and "the erection of new machinery is nearing completion." Indigenous equipment includes a "slurry extraction for uranium purification, pellet sintering furnaces, vacuum annealing furnaces and cold reducing mills." The NFC plans to double the production of nuclear fuel to reach 600 tons per year.

—"Three N-Centers to Be Commissioned near AP," *Financial Express* (Mumbai), 7 August 1995, p. 5; "More Fuel Plants Planned," *Nuclear Engineering International*, October 1995, p. 5.

August 1995

In an interview to *Jane's Defense Weekly*, Indian Vice Admiral Premvir S. Das says that the Indian Navy needs nuclear submarines because India has to cope not only with the threats from Pakistan, which is rapidly modernizing its Navy, but also with "other burgeoning naval powers in the Indian Ocean."

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—"Jane's: Indian Navy to Build Its First Aircraft Carrier," Associated Press, 23 August 1995; in Lexis-Nexis Academic Universe, 23 August 1995, <http://web.lexis-nexis.com>.

July 1995

The Indian Army's 8th Engineer Regiment finishes draining one of the test shafts that had become three-quarters filled with water after three months of work.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 394.

20 July 1995

An Indian government press release states that India is one of the few countries in the world that have managed to achieve a comprehensive capability in the entire nuclear fuel cycle. According to the release, Indian engineers and scientists have successfully mastered the design, construction and operation of nuclear reactors, nuclear fuel reprocessing, and waste management. India has also reached self-reliance in heavy water technology, reactor control systems, and radiation monitoring and radiation safety equipment.

—"Delhi States 'Nuclear Fuel Cycle' Capability," Delhi All India Radio Network, 20 July 1995; in FBIS Document FBIS-NES-95-139, 20 July 1995.

17 July 1995

Speaking to the press, India's Minister of External Affairs Pranab Mukherjee, citing the arrest of a Pakistani national in Germany for smuggling nuclear materials, says that during his visit to Germany, he urged German government to "make all-out efforts" to prevent clandestine transfer of nuclear material through its territory. Mukherjee asserts that there is no pressure on India to sign the NPT "or any conditions imposed for transfer of dual use technology to India." He says that nuclear tests by China and France after the indefinite extension of the NPT only strengthened India's position about inadequacy of current nonproliferation regime.

—"Minister Comments on Countering Pakistani Weapons," All India Radio Network (New Delhi), 6 July 1995; in FBIS Document FTS19950717000323, 17 July 1995.

6 July 1995

At a news conference dedicated to the visit of the Russian Deputy Prime Minister Yuriy Yarov, India's Minister of External Affairs Pranab Mukherjee says India and Russia are in the process of finalizing the protocol to an agreement on the construction of two VVER-1,000 reactors in Koodankulam.

—"Russian Deputy Prime Minister Arrives in New Delhi: Joint Venture Projects Announced," All India Radio Network (New Delhi), 6 July 1995; in FBIS Document FTS19950706000384, 6 July 1995.

3 July 1995

The *Indian Express* (Mumbai) reveals that the leak at the nuclear power plant at Tarapur contaminated drinking water in the area. India's Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says that the leak at the waste immobilization unit of TAPS, which occurred in March this year, is due to "faulty pipe joints in the power station's water decontamination plant....Defective heater coil in the evaporator of the second unit in the liquid decontamination plant had allowed some waste to seep in the drain." According to Gopalakrishnan, the accident

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occurred due to a "faulty design of the American-built plant," commissioned last year. Gopalakrishnan maintains that only "permissible quantities" of radioactive material could have escaped through the leak. A. Gopalakrishnan adds there is "absolutely no danger to anyone within or outside the area of [TAPS]." According to Gopalakrishnan, the radioactive leak has been "successfully contained." He notes that about 3.5 tons of contaminated soil has been "removed and kept for further processing before disposal." The AERB has given the accident provisional rating of level one on the International Nuclear Event Scale.

—Rahul Bedi, "Radioactive Water Leak Threatens Indian Town," *Washington Times*, 8 July 1995, p. A5; Shiraz Sidhva, "India Seeks to Calm N-Fears," *Financial Times*, 5 July 1995; "Radioactive Leak from Tarapur Atomic Power Plant Contained," *Delhi All India Radio Network*, 6 July 1995; in FBIS Document FBIS-NES-95-130, 6 July 1995; "Small Leak at Tarapur Creates Media Outcry," *Nuclear News*, August 1995, p. 76; "3,000 People Hit by Nuclear Plant Leak Near Bombay, Report Says," *Deutsche Presse-Agentur*, 3 July 1995; in Lexis-Nexis Academic Universe, 3 July 1995, <http://web.lexis-nexis.com>; Ashok Sharma, "Radioactive Water Leaks from Power Plant," *Associated Press*, 3 July 1995.

1 July 1995

The Press Trust of India news agency reports that the geologists from India's Atomic Minerals Division have discovered new deposits of uranium in northeastern state of Meghalaya.

—"New Uranium Deposit Discovered in India," *United Press International*, 1 July 1995; in Lexis-Nexis Academic Universe, 29 June 1995, <http://web.lexis-nexis.com>.

July 1995

The *Indian Express* (Mumbai) reports an accident at the Dhruva research reactor in July 1995 was averted by "fortunate happenstance." According to the report, "the inlet hose of a temporary ion exchange unit of the Dhruva reactor got disconnected. Huge amounts of water drained out of the wet storage block, containing the uranium fuel assemblies submerged in the block....The low-level alarm of the storage block was not working, and the water level was just three meters above the top of the uranium rods."

—Sumit Ghoshal, "Series of Near Accidents Cast Doubts on Safety at BARC," *Indian Express* (Mumbai), 17 July 1996, www.expressindia.com.

July 1995

The Indian defense secretary allegedly tells the chief Indian negotiator at the Conference on Disarmament (CD), Arundhati Ghosh, that the defense ministry will continue with nuclear weaponization efforts regardless of what the Indian foreign affairs ministry negotiates at Geneva.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 379.

27 June 1995

Addressing the Parliamentary Consultative Committee for External Policy, India's Minister of External Affairs Pranab Mukherjee says India will not unilaterally halt the production of fissile materials provided "an all-embracing convention, completely banning their production for military purposes, is signed." He underscores that India's nuclear program is peaceful. Mukherjee says that India will not sign the NPT but it will nevertheless continue to

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work for achieving genuine nonproliferation through elimination of all nuclear weapons.

—"Minister Rules Out 'Capping' Fissile Material Production," All India Radio Network (New Delhi), 27 June 1995; in FBIS Document FTS19950627000006, 27 June 1995; Yuri Kozmin, "India Will Not Stop Producing Fissionable Materials," TASS, 287 June 1995; in Lexis-Nexis Academic Universe, 29 June 1995, <http://web.lexis-nexis.com>.

7 June 1995

Project Director of the Kaiga Atomic Power Plant (KAPP) P. Tiwari says the first unit of KAPP will be commissioned in 1996. According to Tiwari, the construction of the new dome for the reactor, which collapsed in May 1994, is in progress. Tiwari says that one of the changes in the new dome design is "a 100mm increase in the thickness of the central portion of the dome from the present 340mm." Tiwari adds it will be possible to synchronize the first unit with the second one, scheduled for commissioning "after a gap of six months." Tiwari notes that the new design incorporates "two independent fast acting shutdown systems, high pressure, intermediate pressure and low pressure emergency core cooling systems. The cooling water to all heavy water heat exchanges will be maintained in a closed loop so that failures in these do not lead to escape of radioactivity in the atmosphere." He adds that the station will have a waste management plant and a waste burial facility, while an environmental laboratory will be established "to study the impact of the plant operation in the environment." According to Tiwari, the site for the nuclear power plant is selected after the "most careful consideration given to all aspects of safety, environment and several other factors."

—"New Design for Kaiga Project," *Financial Express* (Mumbai), 8 June 1995, p. 12.

2 June 1995

In an interview, India's Minister of External Affairs Pranab Mukherjee says there is no pressure on India to sign the NPT. He adds that India has not "felt any change after the NPT members agreed to extend the treaty indefinitely. It is our conviction that genuine nonproliferation can only be achieved within the framework of a time-bound program for the elimination of all nuclear weapons."

—"Minister Interviewed on US, International Issues," *Times of India* (Mumbai), 7 June 1995; in FBIS Document FTS19950607000542, 7 June 1995.

1 June 1995

Speaking in the Rajya Sabha (India's upper house of parliament), Minister of State for Atomic Energy Bhuvanesh Chaturvedi says India is among the few countries that have developed a "comprehensive capability in the entire nuclear fuel technology." He adds that India has also achieved self-reliance in heavy water technology, reactor control system, reactor repair and maintenance technology.

—"Minister Comments on 'Nuclear' Fuel Development," Delhi All India Radio Network, 1 June 1995; in FBIS Document FBIS-NES-95-106, 1 June 1995.

1 June 1995

B.K. Modi announces that his Delhi-based industrial group is negotiating with Electrecite de France to construct a nuclear power plant in India.

—"B.K. Modi group, French Co Plan N-Power Venture," *Financial Express* (Mumbai), 4 June 1995, p. 12.

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June 1995

In an interview to *Le Figaro* (Paris), India's Prime Minister Narasimha Rao says that India is "very concerned" by Pakistan's nuclear program. He remarks that India tried "to draw the world's attention to this danger. In vain." Rao adds that while Pakistan has nuclear weapons, India does not have them. He mentions, however, that India has "the means to produce [nuclear weapons]," but it has never taken this step. Rao points out that India cannot abandon its nuclear option "in the present context."

—"Rao Addresses National Issues, Pakistan, France," *Le Figaro* (Paris), 12 June 1995; in FBIS Document FTS19950612000494, 12 June 1995.

Late May 1995

CANDU Owners Group (COG) formally asks the Canadian government what the scope of permissible cooperation is with India on its two CANDU-types reactors at Rajasthan. India's Department of Atomic Energy (DAE) officials say they are interested in collaboration with Canada in dealing with Rajasthan reactors, yet, they are determined to address the problem of the reactors' ageing on their own should the Canadian government continue to curtail COG activities.

—"COG Seeks Government Guidance on Cooperation with India," *Nucleonics Week*, 1 June 1995, p. 3.

30 May 1995

Speaking at the Consultative Committee of the Scientific Departments in Parliament, Minister of State for Atomic Energy Bhuvnesh Chaturvedi says nuclear energy will play an important role in ensuring India's national energy security and overall development. Atomic Energy Commission (AEC) chairman R. Chidambaram says India has developed comprehensive and self-reliant capability in the field of nuclear power despite the rigid international technology control regimes. According to Chidambaram, the Department of Atomic Energy (DAE) is about to start the construction of the new 500MW pressurized heavy water reactor (PHWR) at Tarapur, as well as develop prototype fast breeder reactor technology. He says about 500 industries in India have developed expertise in different aspects of manufacture of nuclear components and equipment, thus contributing to the indigenous capability.

—"N-Energy 'Must' for Development," *Hindustan Times* (New Delhi), 31 May 1995.

24 May 1995

Minister of State Bhuvanesh Chaturvedi tells the Lok Sabha (India's lower house of parliament) that new design, safety factor, variations in foreign exchange rates and the paucity of funds are the factors behind the delay in completion of India's nuclear power projects.

—"Paucity of Funds' Said Delaying Nuclear Projects," All India Radio Network (New Delhi), 24 May 1995; in FBIS Document FTS19950524000326, 24 May 1995.

24 May 1995

Nuclear Power Corporation (NPC) officials say India is self-reliant in safety-related technologies for its nuclear reactors and will not be affected by the US threats to ban export of such equipment. They claim that these threats are aimed at pressuring India into signing the NPT.

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—"Self-Sufficiency Claimed in Nuclear Technology," *Asian Age* (New Delhi), 25 May 1995, p. 5; in FBIS Document FBIS-NES-95-101, 25 May 1995.

17 May 1995

Speaking in the Rajya Sabha (India's upper house of parliament), India's Minister of External Affairs Pranab Mukherjee says India will not sign the NPT since it does not include a time-bound framework for the elimination of nuclear weapons. He adds that India remains committed to "genuine nonproliferation which can be ensured only when the nuclear weapon states agree to give up their nuclear arsenals and eliminate them under international verification." Mukherjee remarks that India rejects "any unilateral restrictions on India's nuclear program which remains geared exclusively to peaceful purposes."

—"India Committed to Nuclear Nonproliferation but Rejects NPT," Deutsche Presse-Agentur, 17 May 1995; in Lexis-Nexis Academic Universe, 17 May 1995, <http://web.lexis-nexis.com>.

15 May 1995

According to the Department of Atomic Energy's (DAE) performance budget for fiscal year 1995/96, the Rajasthan Atomic Power Station-2 (RAPS) will be shut down for a period of three years. DAE's decision to replace the reactor's cooling channels is the reason for the shutdown.

—R. Ramachandran, "Rajasthan Atomic Power Plant to Be Shut Down for Three Years," *Economic Times* (Mumbai), 22 May 1995.

12 May 1995

A spokesperson for India's Ministry of External Affairs declares that India is not going to sign the NPT in its present form, yet it will continue to work towards complete elimination of nuclear arsenals. The spokesperson remarks that the treaty only perpetuates a discriminatory regime and legitimizes the arsenals of the nuclear weapon states.

—"Spokesman Rules Out Signing NPT in 'Its Present Form'," All India Radio Network (New Delhi), 8 May 1995; in FBIS Document FTS19950512000506, 12 May 1995.

11 May 1995

The NPT is extended indefinitely, a decision that makes the treaty permanent.

—Julia Preston, "Nations Make Nuclear Pact Permanent; US Scores Victory at Global Conference," *Washington Post*, 12 May 1995; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>, 12 May 1995.

8 May 1995

During a meeting with the British foreign secretary Douglas Hurd, India's Minister of External Affairs Pranab Mukherjee says India will not sign the NPT. He adds that New Delhi supports total elimination of nuclear weapons through a multilateral nondiscriminatory, universally verifiable agreement.

—"Minister Rejects UK Plea for Support to Extend NPT," All India Radio Network (New Delhi), 8 May 1995; in FBIS Document FTS19950508000342, 8 May 1995.

May 1995

A report from the Israeli Embassy in New Delhi states that India and Iran have agreed on an accelerated plan to step up cooperation in nuclear research and development. The report also says that India sent nuclear experts to

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Iran.

—"Israeli Paper Alleges Indo-Iran Nuclear Ties," Ma'ariv (Tel Aviv), 21 May 1995; in FBIS Document FTS19950521000175, 21 May 1995.

April 1995

The Indian Army is ordered to ready shafts at the Pokhran test site in the Rajasthan desert for a possible round of nuclear tests. The Army's 8th Engineer Regiment is tasked with refurbishing the two shafts that were built in 1982; it also starts digging a third, shallower shaft. The Army discovers that one of the deeper shafts is filled with up to three-fourths with water.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 394.

April 1995

Scientific Advisor to the Indian government, Dr. A.P.J. Abdul Kalam, sets up a special cell within the Defense Research and Defense Organization (DRDO) to speed up work on India's nuclear command and control system. The cell is tasked with working out problems related to storing nuclear cores at several different strategic locations in the country, apart from the Bhabha Atomic Research Center (BARC) in Trombay; working out mechanisms for mating the nuclear core with the non-nuclear warhead assembly in the shortest time possible; ensuring that command to authorize nuclear detonation remains under civilian authority; and finally, to work out a system so that concurrence of at least three agencies would be required to approve nuclear launch.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 391.

21 April 1995

Addressing the combined commanders' conference in New Delhi, Prime Minister Narasimha Rao reiterates India's commitment to complete elimination of nuclear weapons within a specified timeframe. Rao urges the international community to devise a universal, comprehensive, nondiscriminatory, and verifiable nonproliferation regime. Rao regrets that the NPT "has failed to achieve its objectives, as is evident from clandestine efforts by Pakistan to attain nuclear weapon capability."

—"Rao Reiterates Commitment to Nuclear Nonproliferation," Doordarshan Television Network (New Delhi), 21 April 1995; in FBIS Document FTS19950421000043, 21 April 1995.

15 April 1995

The Tarapur Atomic Power Station (TAPS) is shut down due to the discovery of a leak in its waste immobilization plant. Examinations of the storm water pipe at TAPS reveal the danger level of 20 to 30 micro R/hr, significantly above the prescribed norm of 8 to 15 micro R/hr. The plant's superintendent Kanwar Raj says "the leak occurred in one of the pipes in early March and, as a result, one and a half liters of radioactive waste leaked out." According to reports, the radioactive water seeped into the subsoil. India's Atomic Energy Regulatory Board (AERB) decides not to publicize the event.

—Rahul Bedi, "Radioactive Water Leak Threatens Indian Town," *Washington Times*, 8 June 1995, p. A5; R. Abrel, "Tarapur Lapse," *India Today*, 31 July 1995, p. 42.

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7 April 1995

The Canadian government confirms that Indian and Canadian delegations have met to discuss the safety of India's CANDU-type reactors. A spokesperson for the Canadian Foreign Ministry says that Canada, which severed all nuclear ties with India after the latter's nuclear explosion in 1974, already offered some form of technical assistance to India in 1990. The spokesperson adds that this "limited technical assistance" is fully in compliance with the NPT.

—"Canada and India Renewed Nuclear Contracts, Foreign Ministry Says," Deutsche Presse-Agentur, 7 April 1995; in Lexis-Nexis Academic Universe, 7 April 1995, <http://web.lexis-nexis.com>.

4 April 1995

Bhabha Atomic Research Center (BARC) Director A.N. Prasad says that existing measures for spent nuclear fuel management are insufficient, while their long-term safety can be questioned. He urges the need for a global consensus on this issue. Prasad says that the "disposal of spent fuel without separating the long-lived radioactive products [is] not wise." It only helps to create a "plutonium mine." According to Prasad, the time has come to "perceive plutonium as energy and not evil." Prasad argues that separating plutonium from spent fuel will "considerably augment energy resources" and make the nuclear waste more "easily manageable from the safety point of view." Prasad says India is one of the few countries that developed the technology for reprocessing and "immobilization of fission product waste in non-leacheable glass matrix."

—"Consensus on Spent Nuclear Fuel Stressed," *Financial Express* (Mumbai), 4 April 1995.

3 April 1995

Speaking to the news conference at Panjim, Bharatiya Janata Party (BJP) leader Atal Bihari Vajpayee warns the Congress government led by Narasimha Rao not to compromise India's national security by giving up its nuclear option and indigenous missile program under pressure from the United States. He urges the government to take the Parliament and people into confidence on its intentions regarding these two "vital" issues. A resolution, adopted at BJP's meeting in Panjim says the government's decision to negotiate the production of fissile material would put plutonium production under international safeguards, thus capping India's nuclear option. The BJP holds that only an absolutely non-discriminatory agreement for halting fissile material production can be satisfactory. As such, "it must not allow the continued possession [of fissile material] by some nuclear weapon states while capping, reducing, and eliminating the capacity of the others."

—Paul Iredale, "Opposition Says India Giving Up on Nuclear Option," Reuters, 3 April, 1995; "India's Main Opposition Party Wants to Build Nuclear Bomb," Associated Press, 3 April 1995; in Lexis-Nexis Academic Universe, 3 April 1995, <http://web.lexis-nexis.com>.

Early April 1995

Managing Director of the CANDU Owners Group (COG) Barry Collingwood says Canada is considering safety-related cooperation with India on Rajasthan-1 and -2 CANDU-type reactors. He emphasizes that it will be strictly safety-related cooperation "under [the] auspices of IAEA [International Atomic Energy Agency]" and "within current Canadian policy." [Note: The assistance is offered under the policy document of 30 May 1990 on Canadian policy towards India and Pakistan, which offered Canadian expertise to Indian and Pakistani engineers to ensure ongoing safety of the Kanup and Rajasthan CANDU reactors if their governments met the requirements of the IAEA and the

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UN.]

—"Canadian Team Explores Safety Aid to India under 1990 Policy Change," *Nucleonics Week*, 13 April 1995, p. 13.

April 1995

India's Minister of External Affairs Pranab Mukherjee says that Pakistan's construction of a second nuclear reactor vindicates India's fears "that the nonproliferation treaty has failed to check clandestine transfer of nuclear technology." Mukherjee remarks that India is not going to participate in the NPT review conference and has no intention of sending an official observer.

—Ian Stewart, "India Targets Pakistan Nuke Program," United Press International, 10 April 1995; in Lexis-Nexis Academic Universe, 11 April 1995, <http://web.lexis-nexis.com>; Ian Stewart, "Indo-Pakistan Rift to Thwart NPT," United Press International, 11 April 1995; in Lexis-Nexis Academic Universe, 12 April 1995, <http://web.lexis-nexis.com>; Philippe Sauvanargues, "India to Be Consciously Absent at Nonproliferation Conference," Agence France Presse, 13 April 1995; in Lexis-Nexis Academic Universe, 12 April 1995, <http://web.lexis-nexis.com>.

27-29 March 1995

Canada sends a fact-finding mission to India "to explore the possibilities of nuclear cooperation within the parameters of current Canadian policy.

—"Canadian Team Explores Safety Aid to India under 1990 Policy Change," *Nucleonics Week*, 13 April 1995, p. 13.

22 March 1995

India's Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says India's accession to Convention on Nuclear Safety in 1994 will open its nuclear installations to international scrutiny. According to Gopalakrishnan, the Directorate of Regulatory Inspection and Enforcement, set up in January 1994, "has conducted many surprise checks on nuclear power plants [in India] to ensure nuclear safety."

—Neelam Jain, "Expert Warns India of Nuclear Scrutiny," United Press International, 22 March 1995.

21 March 1995

Former Atomic Energy Commission (AEC) Chairman P.K. Iyengar says that the discoveries made in the field of unconventional fissile materials must be taken into consideration during the NPT review process. He says that a new fuel, atomic "issomiyur," capable of releasing enormous amount of energy without fission, has been discovered. He argues that the fission fuel can also be produced in laboratories called accelerator or "smayer" centers. According to Iyengar, it is impossible to prevent the spread of these technologies since they are used in medicine and isotope production.

—"Official Views Unconventional 'Nuclear' Fabrication," *Dinamani* (Chennai), 22 March 1995, p. 9; in FBIS Document FBIS-NES-95-102, 22 March 1995.

20 March 1995

In a statement before the Subcommittee on Near Eastern and South Asian Affairs, US Assistant Secretary for South Asian Affairs Robin Raphel says the United States "seeks first to cap, then overtime reduce, and finally eliminate weapons of mass destruction (WMD) and ballistic missile delivery systems in South Asia. We seek also to help reduce tensions and avoid conflicts which could possibly escalate to the use of WMD or ballistic missiles....We seek

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to inhibit exports to India and Pakistan of goods and technology that can contribute to WMD and missile delivery systems and to discourage third countries from supporting such programs. We have also pursued the idea of convening a multilateral conference to discuss security and nonproliferation in South Asia. This proposal has been stalled, principally due to Indian concerns over the scope and participation envisioned for such a conference. India prefers a global over a regional focus, and objects to Pakistan's insistence on explicit inclusion of Kashmir on the agenda."

— Robin Raphel, "Nonproliferation Policy in South Asia," statement before the Subcommittee on Near Eastern and South Asian Affairs, Washington, DC, 9 March 1995 ; in Lexis-Nexis Academic Universe, 11 April 1995, <http://web.lexis-nexis.com>.

4 March 1995

Kakrapar-2 is synchronized to India's Western grid, following mandatory tests and authorization from the Atomic Energy Regulatory Board (AERB). The 220MWe unit will provide further operating information on thorium fuel that India intends to use in its nuclear power program. According to India's Nuclear Power Corporation (NPC) officials, Kakrapur is equipped with "two diversified independent shutdown systems, a high level of redundancy in equipment, double containment, and the latest fire safety solutions." The addition of this reactor to the Western grid brings India's total nuclear power capacity to 1940MWe.

—Government of India *Department of Atomic Energy Annual Report: 1994-1995*, p. 2.2; "Kakrapur 2 Starts Up," *Nuclear Engineering International*, May 1995, p. 13.

23 February 1995

Addressing a news conference in New Delhi, India's Minister of External Affairs Pranab Mukherjee reiterates that India will neither unilaterally cap the production of fissile material nor sign any discriminatory nonproliferation agreement that is not linked to a phased elimination of nuclear weapons. India's Foreign Secretary K. Srinivasan says that India may attend the NPT review conference as an observer.

—"India Will Not Sign Nuclear Treaty," United Press International, 23 February 1995; in Lexis-Nexis Academic Universe, 24 February 1995, <http://web.lexis-nexis.com>.

11 February 1995

The Indian government publicly states that India will not accept any caps on its nuclear program until a satisfactory convention to prohibit the production of fissile material for weapons purposes enters into force.

—"India Not to Accept Restrictions on Nuclear Program," Xinhua News Agency, 11 February 1995; in Lexis-Nexis Academic Universe, 12 February 1995, <http://web.lexis-nexis.com>.

20 January 1995

The chief executive of the Nuclear Fuels Complex (NFC) Dr. K.K. Sinha says that the uranium purchased from China will be processed at the NFC. According to press reports, India has received 30 tons of enriched uranium from China in three consignments since the beginning of the year.

—"India Receives 30 tons of Nuclear Fuel from China," Deutsche Presse-Agentur, 20 January 1995; in Lexis-Nexis Academic Universe, 20 January 1995, <http://web.lexis-nexis.com>; "China to Supply Uranium for Indian Plant," 23 January 1995; in Lexis-Nexis Academic Universe, 22 January 1995, <http://web.lexis-nexis.com>.

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10 January 1995

Commenting on the first consignment of enriched uranium India received from China on January 5, 1995, Bhabha Atomic Research Center (BARC) Director A.N. Prasad says India is buying "only raw material and the rest of the processing including fabrication of fuel is done [at the Nuclear Fuels Complex] in Hyderabad." He remarks that India is buying enriched uranium from China to avoid using its unsafeguarded material at the Tarapur Atomic Power Station (TAPS), which is under International Atomic Energy Agency (IAEA) safeguards.

—"India Buys Nuclear Fuel from China as Domestic Prices Costlier," *Deutsche Presse-Agentur*, 10 January 1995; in Lexis-Nexis Academic Universe, 10 January 1995, <http://web.lexis-nexis.com>; "India Defends Purchase of Enriched Uranium from China," *Agence France Presse*, 10 January 1995; in Lexis-Nexis Academic Universe, 10 January 1995, <http://web.lexis-nexis.com>.

8 January 1995

The second unit of the Kakrapar Atomic Power Station (KAPS) achieves criticality. According to Atomic Energy Commission (AEC) officials, the unit has the latest technology in its coolant system and other safety mechanisms to avoid Narora-type incidents.

— Government of India, *Department of Atomic Energy Annual Report: 1994-1995*, p. 2.2; "Kakrapar 2 Starts Up," *Nuclear Engineering International*, May 1995, p. 13; Neelam Jain, "India Gets One More Nuclear Plant Working," 9 January 1995; in Lexis-Nexis Academic Universe, 9 January 1995, <http://web.lexis-nexis.com>.

7 January 1995

Indian government officials say India is buying enriched uranium from China to fuel the Tarapur Atomic Power Station (TAPS). The first batch of the uranium arrived from the China Nuclear Energy Corporation on January 5, 1995. According to the officials, the sale has been approved by the International Atomic Energy Agency (IAEA), which is expected to inspect TAPS to make sure it complies with safeguards protocols.

—"India Turns to China to Fuel Nuclear Plant," *New York Times*, 8 January 1995; in Lexis-Nexis Academic Universe, 8 January 1995, <http://web.lexis-nexis.com>; Krishnan Guruswami, "India Buys Enriched Uranium from China for a Nuclear Power Plant," *Associated Press*, 7 January 1995; in Lexis-Nexis Academic Universe, 7 January 1995, <http://web.lexis-nexis.com>.

6 January 1995

Unit 1 of the Narora Atomic Power Station (NAPS) is resynchronized to the power grid. It went critical in December 1994 for the first time since the March 1993 fire that damaged its turbine generator.

—Government of India, *Department of Atomic Energy Annual Report: 1994-1995*, p. 3.3.

Early 1995

Differences emerge within India's Atomic Energy Commission on the merits of signing the Comprehensive Test Ban Treaty (CTBT) in the absence of further Indian nuclear tests. A group of scientists led by the Director of the Bhabha Atomic Research Center (BARC) Dr. Anil Kakodkar and the Director of the Solid State & Spectroscopy Group and head of the nuclear weapons program, Dr. S. K. Sikka, oppose the CTBT on grounds that it would effectively block further Indian nuclear weaponization efforts. The scientists are supported in their efforts by the defense ministry.

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—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 379.

January 1995

The Chairman of the Atomic Energy Commission (AEC) Dr. R. Chidambaram prepares a position paper on the Comprehensive Test Ban Treaty (CTBT) for the Indian government. In this paper, Chidambaram articulates the view that a CTBT would be acceptable if such a treaty were linked to the elimination of nuclear stockpiles by the permanent nuclear weapon states. The AEC's position varies from the position adopted by the Ministry of External Affairs (MEA) under the Rajiv Gandhi Action Plan in the late 1980s. The latter maintains that India should not cross the nuclear threshold if the five nuclear weapon states: start negotiations on the elimination of their nuclear weapons; sign the CTBT; and agree to a fissile material cut-off treaty;

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 377.

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1994

26 December 1994

The Indian government denies media reports that workers at the uranium mine in Jaduguda and the population nearby are exposed to radioactive contamination. Government officials say the exposure is "well within the limits stipulated by the Atomic Energy Regulatory Board [AERB]." According to a government press release, the AERB continuously monitors the overall impact of Uranium Corporation's operation of the mine in Jaduguda.

—"Reports on Contamination at Uranium Mine Denied," BBC Summary of World Broadcasts, 28 December 1994; in Lexis-Nexis Academic Universe, 27 December 1994, <http://web.lexis-nexis.com>.

23-24 December 1994

During Russian Prime Minister Viktor Chernomyrdin's visit to India, the two sides sign eight agreements, including an accord on military and technical cooperation until the year 2000. An agreement on the construction of two VVER-1,000 reactors in Koodankulam, Tamil Nadu, is put on hold once again. The two sides describe the talks as "continuing."

—"India, Russia Sign Military, Space, Trade Accords, No Nuclear Accord," AFX News, 23 December 1994; in Lexis-Nexis Academic Universe, 24 December 1994, <http://web.lexis-nexis.com>; Pradip Chakravarty, "Russian Prime Minister Begins Visit to India," Agence France Presse, 23 December 1994; in Lexis-Nexis Academic Universe, 24 December 1994, <http://web.lexis-nexis.com>.

22 December 1994

Russian Atomic Energy Minister Viktor Mikhailov says he is convinced Russia will build a nuclear power plant in Koodankulam, Tamil Nadu. He adds that a protocol to the agreement of 1988 "is almost ready." He notes, however, that "certain details" still need to be discussed. For example, India wants Russia "to take upon itself the responsibility of reprocessing nuclear waste of the plant later to be returned to India for burning." Yet he says he

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sees no obstacles to begin the construction. According to Mikhailov, a timetable for plant construction is already established: it is expected to commence in 1995 and to be completed within eight years. He says that the ways to finance the project have also been determined.

—Gennadi Yeznov, Sergei Karmalito, and Leonid Kotov, "No Obstacle in Russian Help to Build Nuke Plants in India," ITAR-TASS, 22 December 1994; in Lexis-Nexis Academic Universe, 23 December 1994, <http://web.lexis-nexis.com>.

8 December 1994

Former Atomic Energy Commission (AEC) Chairman M.R. Srinivasan says that India's Advanced Technology Vehicle (ATV), the project to build a nuclear power submarine, is located in the port city of Visakhapatnam. According to Srinivasan, "the design and development of a nuclear submarine is a joint project of the Department of Atomic Energy, the Defense Research and Development Organization and the Indian Navy. The boat design is the responsibility of DRDO and the Indian Navy. The nuclear power unit design is the responsibility of DAE. For many years now, a joint team from the Bhabha Atomic Research Center and the Navy has been working on the submarine nuclear power unit." Srinivasan says India switched to enriched uranium to fuel its submarine reactor since the reactor has to be "capable of very rapid increase in power level and hence special designs of fuel elements are necessary. The submarine [reactor] has to be extremely compact in size and with minimum weight." Srinivasan adds that the work in the areas of "fuel, control systems, and reactor components" was undertaken. According to Srinivasan, "a land-based prototype facility for testing the reactor has been completed."

—Atul Aneja, "N-Sub Era May Dawn Only After a Decade," *Hindu* (Chennai), 10 July 1996, www.hinduonline.com; Ranjan Roy, "Expert Confirms India's Nuclear Submarine Project," Associated Press, 8 December 1994; in Lexis-Nexis Academic Universe, 1 October 1994, <http://web.lexis-nexis.com>; Rahul Bedi, "Race for Nuclear Submarine," *South China Morning Post*, 9 December 1994; in Lexis-Nexis Academic Universe, 1 October 1994, <http://web.lexis-nexis.com>.

3 October 1994

Speaking at the 14th Plenary Meeting of the 49th Session of the UN General Assembly, India's External Affairs Minister Pranab Mukherjee says the time has come to reach agreement on "global, comprehensive, verifiable, and nondiscriminatory" disarmament regime since the Cold War is over and "the previous adversaries have been drawn into a partnership for peace." He adds that the NPT review in April 1995 offers "another opportunity... to refashion the treaty into a real instrument for global disarmament."

—Pranab Mukherjee, Speech at the 14th Plenary Meeting of the 49th Session of the UN General Assembly, 3 October 1994, Ministry of External Affairs, Government of India, www.meadev.nic.in.

30 September 1994

Indian Express (Mumbai) reports that the Rajasthan Atomic Power Station (RAPS), one of the oldest CANDU-type reactors in India, is undergoing "safety checks" in the aftermath of recent Canadian reports on the possibility of rupture in the pressure tubes of India's CANDU reactors. According to the newspaper report, RAPS will resume operation "after it meets safety-related requirements." The Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says the Nuclear Power Corporation (NPC) and Bhabha Atomic Research Center (BARC) are checking the facility's performance. He adds that "no rupture had ever occurred" at India's pressurized heavy water reactors.

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—"India Reactor Down for Repairs," United Press International, 30 September 1994; in Lexis-Nexis Academic Universe, 1 October 1994, <http://web.lexis-nexis.com>.

26 September 1994

India is elected as the Chairman of the International Atomic Energy Agency's (IAEA) Board of Governors. This represents only the second time in which India has held this honor. The chairmanship is taken over by Dr. R. Chidambaram, Chairman of the Atomic Energy Commission (AEC) and Secretary of the Department of Atomic Energy (DAE).

—Government of India, *Department of Atomic Energy Annual Report: 1994-1995*, p. 8.1.

25 September 1994

Responding to Canadian reports on the poor condition of India's CANDU reactors (particularly the pressure tubes in reactors' coolant systems), Managing Director of the Nuclear Power Corporation (NPC) S.K. Chatterjee says "there has been no incident involving the pressure tubes." He argues that India has started the replacement of the reactors' aging parts "long ago." Specifically, replacements of coolant channels was initiated two years ago, but the process is expected to take about 30 months to complete, he says. Chatterjee adds that the reactors' pressure tubes are under continuous monitoring and are replaced "whenever necessary."

—Ian Stewart, "Official Says India's Reactors are Safe," United Press International, 25 September 1994; in Lexis-Nexis Academic Universe, 26 September 1994, <http://web.lexis-nexis.com>.

20 September 1994

India signs the International Convention in Nuclear Safety at a ceremony in Vienna.

—Government of India, *Department of Atomic Energy Annual Report: 1994-1995*, p. 8.1.

19 September 1994

In an interview with *Indian Express*, former Atomic Energy Commission (AEC) Chairman M.R. Srinivasan says "...there are responsible persons who know we have the nuclear weapons capability...there are no doubts in my mind about it."

—Cited in, George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999).

31 August 1994

The Bharatiya Janata Party's (BJP) leader L.K. Advani says that "India must not compromise on its nuclear programs [and should keep] a strict vigil over the neighboring countries' nuclear programs."

—Ian Stewart, "India Seeks Nuclear Deterrent," United Press International, 31 August 1994; in Lexis-Nexis Academic Universe, 1 September 1994, <http://web.lexis-nexis.com>.

24 August 1994

Several Indian members of parliament express concern over the announcement made by Pakistan Prime Minister Nawaz Sharif that Islamabad possesses nuclear weapons. An Indian foreign ministry official reassures parliament, "if the safety and security of the nation require deployment of conventional and non-conventional weapons on the border, the government will not hesitate to do so."

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—"Indian MPs Express Concern over Pakistan's Nuclear Bomb Claim," Deutsche Presse-Agentur, 24 August 1994; in Lexis-Nexis Academic Universe, 24 August 1994, <http://web.lexis-nexis.com>; George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 349.

23 August 1994

Former Pakistani Prime Minister Nawaz Sharif declares that "...Pakistan possesses a nuclear bomb....[and] by bringing facts on the record, I have not only pre-empted the Indian aggression against Azad Kashmir and the government's planned rollback, but made it clear to responsible international powers that Pakistan should be treated at par with India in the world community and in the region."

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 349.

22 August 1994

India calls on Pakistan to support an agreement against the use of nuclear weapons in South Asia "with sincerity of purpose so that it could form the basis of a comprehensive dialogue." Addressing the Indian Parliament, Minister of State for External Affairs R.L. Bhatia says India's proposal is "a demonstration of its commitment for reducing mistrust and enhancing confidence between the two countries." He adds that Pakistan's response to India's proposal "was regrettably dismissive."

—"India Seeks Anti-Nukes Pledge," United Press International, 22 August 1994; in Lexis-Nexis Academic Universe, 23 August 1994, <http://web.lexis-nexis.com>.

August 1994

Prime Minister Rao requests that German Chancellor Helmut Kohl provide New Delhi with the details of the plutonium smuggling issue.

—"Hindu Leader Urges India to Manufacture Nuclear Bombs," Deutsche Presse-Agentur, 22 August 1994; in Lexis-Nexis Academic Universe, 22 August 1994, <http://web.lexis-nexis.com>.

19 July 1994

Members of India's Lok Sabha (lower house of parliament) discuss the alleged plutonium smuggling to Pakistan from Russia via Germany. They urge the government to raise the issue at international forums and seek to declare Pakistan a terrorist state. Congress member Sribalav Panigrahi says, "the documents seized from Germany clearly proved that Pakistan was involved in smuggling of plutonium." Senior Bharatiya Janata Party's (BJP) leader Jaswant Singh says the matter cannot be taken lightly.

—"Indian MPs Worried over Reported Plutonium Smuggling by Pakistan," Deutsche Presse-Agentur, 19 August 1994; in Lexis-Nexis Academic Universe, 19 August 1994, <http://web.lexis-nexis.com>.

10 July 1994

Managing Director of the Nuclear Power Corporation (NPC) Samir Chatterjee says that India's initial target of 10,000MW of nuclear power by 2000 is unattainable due to the lack of governmental funding.

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—Madhu Nainan, "Cash Crunch Short-Circuits India's Nuclear Power Program," Agence France Presse, 10 July 1994; in Lexis-Nexis Academic Universe, 8 July 1994, <http://web.lexis-nexis.com>.

5 July 1994

Managing Director of the Nuclear Power Corporation (NPC) Samir Chatterjee says India is "revising an old proposal from the Soviet Union [to construct two 1,000 VVER reactors in Koodankulam, Tamil Nadu]." According to Chatterjee, the Russian government has offered credit for "services and components for the project." He adds that the reactors would use Russian fuel, which would be supplied under International Atomic Energy Agency (IAEA) safeguards.

—"India, Russia Nuclear Power Plant Negotiations on Track," Agence France Presse, 5 July 1994; in Lexis-Nexis Academic Universe, 11 June 1994, <http://web.lexis-nexis.com>.

June 1994

India's representative at the Conference on Disarmament (CD) in Geneva issues a statement supporting the Comprehensive Test Ban Treaty as an important step in the direction of nuclear disarmament.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 348.

1994

Indian Defense Secretary K. Nambiar prepares a note on the eve of the beginning of the Comprehensive Test Ban Treaty (CTBT) negotiations for the defense minister opposing a treaty that bans underground nuclear tests. However, the note is not presented to the Indian government nor communicated to the foreign ministry formally in charge of negotiations at the Conference on Disarmament in Geneva.

1994

Prime Minister Narasimha Rao allegedly authorizes Indian nuclear scientists and engineers to perform maintenance work on the test shafts at the Pokhran test site, and perhaps even emplace nuclear devices in the shafts, to signal India's growing impatience with US nonproliferation policy toward India.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 374.

1994

The deal reportedly brokered by mid-level diplomats in India's Ministry of External Affairs with the US State Department on proliferation issues ends as the United States begins adopting a tougher stance toward India's nuclear weapons program.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 373-374.

11 June 1994

Addressing delegates of India's ruling Congress party, Prime Minister Narasimha Rao says that his government does not "want to give up the choice of producing a bomb." He adds that the government has to consider "the developing situation in the world on nuclear disarmament, and then decide future course of action." According to

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Rao, "first those countries [that] have nuclear weapons should reduce [their stocks] within a time frame. Second, those having nuclear capability should not make one [bomb]." Rao adds that governments should not play with the weapons of mass destruction.

—"India to Retain Its Nuclear Option," United Press International, 11 June 1994; in Lexis-Nexis Academic Universe, 12 June 1994, <http://web.lexis-nexis.com>; "India Says it Won't Give up Option to Make Nuclear Weapons," Associated Press, 11 June 1994; in Lexis-Nexis Academic Universe, 11 June 1994, <http://web.lexis-nexis.com>.

10 June 1994

At the Bharatiya Janata Party's (BJP) executive meeting, party leader L.K. Advani says that India must go nuclear and reject pressure from the United States and the international community. He adds that this is necessary to safeguard India's "integrity, security, and sovereignty." Advani notes that behind the US nonproliferation efforts is "the unstated assumption that India must subcontract its national security to Washington."

—"India to Retain Its Nuclear Option," United Press International, 11 June 1994; in Lexis-Nexis Academic Universe, 12 June 1994, <http://web.lexis-nexis.com>; "India Says it Won't Give up Option to Make Nuclear Weapons," Associated Press, 11 June 1994; in Lexis-Nexis Academic Universe, 11 June 1994, <http://web.lexis-nexis.com>.

Late May 1994

Prime Minister P.V. Narasimha Rao orders Indian nuclear scientists and engineers working on the nuclear weapons project to be discreet. In particular, Rao requests Atomic Energy Commission (AEC) Chairman R. Chidambaram not to make any statements on the nuclear issue that might affect India's foreign policy.

—Raj Chengappa, "Tell Your President, I Keep My Work," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 389.

Late May 1994

At a working-level meeting in London, India rejects US proposals for a five-party (India, Pakistan, China, the United States, and Russia) denuclearization arrangement for South Asia.

—Thomas W. Lippman, "US Effort to Curb Nuclear Weapons in Peril as India Insists on Limits for China," *Washington Post*, 7 July 1994; in Lexis-Nexis Academic Universe, 3 May 1994, <http://web.lexis-nexis.com>.

18 May 1994

India tests an air-deliverable nuclear device minus its plutonium core using a Mirage 2000 aircraft at the Balasore test range in Orissa. The telemetry stations at Balasore record the bomb's flight as well as the status of a series of safety locks on the device. The latter include a rotating vane "that indicates to the bomb's on-board control systems that the container is on its way, an altimeter that enables the weapon to explode at a pre-set height above the ground, and a power lock mechanism which activates the high-voltage current needed to trigger the bomb, only after it receives confirmation that all systems are in order." Three bombing trial runs are conducted in a single day and the data collected from the tests indicates that the weapon's technical parameters are in working order. India finally acquires a reliable air-deliverable nuclear weapon.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), pp. 383-384.

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18 May 1994

Commemorating the 20th anniversary of India's "peaceful nuclear explosion," former Atomic Energy Commission (AEC) Chairman P.K. Iyengar writes in a newspaper article that "India has now lived for 20 years with no need to explode a device once again. Once the tiger is tamed, there is no fear from the same type of tiger, whether it is in your backyard or your neighbor's."

—"India Observes 20th Nuclear Test Anniversary," United Press International, 19 May 1994; in Lexis-Nexis Academic Universe, 3 May 1994, <http://web.lexis-nexis.com>.

14-19 May 1994

Indian Prime Minister Narasimha Rao visits the United States. He meets with US President Bill Clinton to discuss an array of economic and political issues. During the visit, both sides agree that the nuclear issue has to be discussed in a larger multilateral forum, rather than a bilateral one. Rao reiterates that India favors starting with the global agreement on no-first-use of nuclear weapons and gradually proceeding to the ultimate goal of elimination of nuclear weapons and a ban on missile testing and deployment.

—"Indian PM Leaves for US Tour," United Press International, 14 May 1994; in Lexis-Nexis Academic Universe, 15 May 1994, <http://web.lexis-nexis.com>; John F. Burns, "India Resists Plan to Curb Nuclear Arms," *New York Times*, 15 May 1994; in Lexis-Nexis Academic Universe, 15 May 1994, <http://web.lexis-nexis.com>; "Rao's Passage to America," *Times*, 17 May 1994; in Lexis-Nexis Academic Universe, 18 May 1994, <http://web.lexis-nexis.com>; Rita Beamish, "Clinton Praises 'Closing Working Relationship' with India," Associated Press, 19 May 1994; in Lexis-Nexis Academic Universe, 19 May 1994, <http://web.lexis-nexis.com>; John Goshko, "Clinton Moves to Ease Relationship with India," *Washington Post*, 20 May 1994; in Lexis-Nexis Academic Universe, 19 May 1994, <http://web.lexis-nexis.com>; Dilip Bobb, "Rao's US Visit: a Quiet Triumph," *India Today*, 15 June 1994, pp. 26-32.

3 May 1994

Prime Minister Narasimha Rao assures Rajya Sabha (upper house of parliament) that India will not accept any regional nuclear nonproliferation arrangements. He also rules out abiding by the US-proposed nuclear capping arrangement.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 346.

2 May 1994

Parliamentary affairs Minister R.C. Shukla addresses parliament and states that "India will not make any compromise [on the issues of its nuclear and missile programs] under pressure [from the United States]." He adds that Prime Minister Rao will meet US President Bill Clinton on 19 May as scheduled. The Bharatiya Janata Party leader L.K. Advani and the Janata Dal leader George Fernandes urge the government to disclose the outcome of London talks between the United States and India to dissipate doubts that India has succumbed to US pressure on these sensitive issues.

—"India not to Succumb to US Nuclear Pressure," Xinhua General Overseas News Service, 2 May 1994; in Lexis-Nexis Academic Universe, 3 May 1994, <http://web.lexis-nexis.com>.

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Early May 1994

Scientists at the Terminal Ballistics Research Laboratory (Chandigarh) finish work on the non-nuclear assembly mechanism of an air-deliverable nuclear device; the device (without the plutonium core) is transported on board an Indian Air Force (IAF) AN-32 to Kalaikunda, about a 100km from Calcutta. Engineers at the Armament Research & Development Establishment (ARDE) in Pune also finish work on the container for the nuclear device. Ground tests are conducted to ensure that the container can withstand stresses of flight. Engineers at ARDE also develop a bomb-release mechanism and "half a dozen safety interlocks." A set of four containers is airlifted to Kalaikunda for final assembly of the air-deliverable nuclear device.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 382.

April 1994

In an interview to *India Today*, Atomic Energy Commission (AEC) Chairman R. Chidambaram says that India was "the only country so far to have conducted [its] first test underground. It was a measure of how confident we were of our design. Everything worked as planned. There was no radiation emitted on the surface. That's how good our bomb was." Answering a question on whether India is still producing nuclear weapons, Chidambaram notes evasively that India has developed "an extraordinary range of know-how and expertise on all aspects of nuclear technology, especially in applications such as power, medicine, and agriculture. There is now nothing India cannot do." Furthermore, Chidambaram notes that India fell short of fulfilling the targets for its nuclear power program due to the "lack of funds." He emphasizes that India has an independent Atomic Energy Regulatory Board to ensure that the safety measures at India's nuclear power plants meet international standards. According to Chidambaram, India's safety record has been "good" with the exception of the accident at Narora in March 1993. Denouncing US nonproliferation initiatives in the region, Chidambaram says, "India has observed the longest moratorium on nuclear bomb explosions. Se we don't have to take lessons on morality from the US or anyone else...we are not in favor of any regional capping effort or having countries broker a deal between India and Pakistan on the nuclear question."

—Raj Chengappa, "Say No to Regional Capping," *India Today*, 30 April 1994, p. 50; George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 344.

April 1994

India's former Foreign Secretary Muchkund Dubey says India is going to have its "hands and feet tied" should it accede to the nine-nation conference (the United States, the United Kingdom, Russia, China, France, Japan, Germany, India, and Pakistan), as advocated by the United States. He adds that "the bomb option is the currency of power that is critical to our survival as a strong nation." Bhabha Atomic Research Center (BARC) director Dr. A.N. Prasad remarks that India now has "a mature program which [it has] built up after heavy investments. It would be a big mistake to fritter it away and lose our advantages."

—Raj Chengappa, "Nuclear Dilemma," *India Today*, 30 April 1994, pp. 46-54.

30 April 1994

Indian ambassador to the United States S.S. Ray says the US State Department has denied that the Indo-US talks in

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London were aimed at "pressuring India on the nuclear issue."

—"India's Envoy Says Reports on British Intelligence Pressure for US Talks 'Bull'," BBC Summary of World Broadcasts, 2 May 1994; in Lexis-Nexis Academic Universe, 1 May 1994, <http://web.lexis-nexis.com>.

28 April 1994

A spokesperson for India's ruling Congress party tells the press that India does not intend to change its stance on the NPT. He says that the "routine" talks between India and the United States in London (27-28 April) include no secret discussions of the nuclear issue.

—"India Rules Out Signing of NPT Treaty," Xinhua General Overseas News Service, 29 April 1994; in Lexis-Nexis Academic Universe, 30 April 1994, <http://web.lexis-nexis.com>.

27 April 1994

Indo-US officials meet in London to discuss US nonproliferation initiatives in South Asia. However, US officials end the meeting early after Indian officials backtrack by suggesting that all countries of relevance to the nuclear issue, such as Iran, North Korea, and Libya, be invited to the international conference.

George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 345.

13 April 1994

Addressing Indian Army commanders, Prime Minister Narasimha Rao says that "any suggestion to restrict India's nuclear option is unacceptable and unrealistic." Rao adds that India favors time bound, universal, and non-discriminatory approach to nuclear disarmament.

—Vijay Joshi, "India Will Go Ahead with Nuclear Options, Says Premier Rao," Associated Press, 13 April 1993; in Lexis-Nexis Academic Universe, 13 April 1994, <http://web.lexis-nexis.com>; Raj Chengappa "Nuclear Dilemma," *India Today*, 30 April 1994, pp. 46-54; George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 345.

8-10 April 1994

US Deputy Secretary of State Strobe Talbott visits India and Pakistan. Addressing a news conference in New Delhi he says that "...nuclear nonproliferation is a major issue which needs to be addressed immediately." At the end of his visit, he notes that there is a "...conceptual basis for [US] objective of first capping, then reducing and eventually eliminating weapons of mass destruction from South Asia. We are optimistic of its success."

—"USA Rules out Pakistan F-16 Sale without Cap on Nuclear Weapons," BBC Summary of World Broadcasts, 11 April 1994; in Lexis-Nexis Academic Universe, 10 April 1994, <http://web.lexis-nexis.com>; Kathy Gannon, "Rocky Road Ahead for US Plan to Halt Arms Race on Subcontinent," Associated Press, 9 April 1994; in Lexis-Nexis Academic Universe, 9 April 1994, <http://web.lexis-nexis.com>; Raj Chengappa, "Nuclear Dilemma," *India Today*, 30 April 1994, pp. 46-54.

8 April 1994

India's Department of Atomic Energy (DAE) signs a \$23 million contract for the sale of 100 tons of heavy water to

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the Korea Electric Power Company. The heavy water will be shipped in 1997-1998 and will be subject to International Atomic Energy Agency (IAEA) safeguards.

—"India to Supply Heavy Water to South Korea," Japan Economic Newswire, 8 April 1994; in Lexis-Nexis Academic Universe, 8 April 1994, <http://web.lexis-nexis.com>; "India Signs Deal with South Korea for Heavy Water Supply," BBC Summary of World Broadcasts, 11 April 1994; in Lexis-Nexis Academic Universe, 10 April 1994, <http://web.lexis-nexis.com>.

1 April 1994

Atomic Energy Commission (AEC) Chairman R. Chidambaram says in an interview that India's peaceful nuclear program is more advanced than the nuclear programs of both Pakistan and China. According to Chidambaram, India has developed technical expertise in all stages of the nuclear fuel cycle, including preparation of materials such as uranium, thorium, and zirconium; the reprocessing of spent fuel and the manufacture of related equipment; heavy water and fuel element production; and the construction of nuclear power plants. He adds that because of this technical expertise, India is now in a position to export both research reactors and heavy water, in compliance with international safeguards. Chidambaram also says that India's goal of generating 10,000MW of power by the year 2000 has been compromised due to the scarcity of funds. Referring to the safety issues at India's nuclear power plants, he says that the Atomic Energy Regulatory Board (AERB) is an independent organization that oversees and regulates all safety-related activities. He says that safety is incorporated into India's nuclear power plants "right from the selection of the site." He adds that the plants operate in conformity with international standards "such as those prescribed by the International Commission on Radiological Protection." —"Official Discusses Nuclear Energy Use," *Hindustan Times* (New Delhi), 2 April 1994, p. 2; in FBIS Document FBIS-NES-94-010.

Late March 1994

In the aftermath of a meeting with the US Assistant Secretary of State for South Asia Robin Raphel, a senior Indian government official says India opposes any agreement to halt production and deployment of nuclear weapons if it is confined to India and Pakistan only. Indian government officials say they would consider India's security threatened if the United States finally delivers the F-16 jet fighters Pakistan purchased in 1990 but has not received to date. The delivery of the F-16s has been proposed in return for Pakistan's acceptance of international inspections of its nuclear installations.

—John F. Burns, "India Rejects US Bid for Nuclear Pact with Pakistan," *New York Times*, 26 March 1994; in Lexis-Nexis Academic Universe, 26 March 1994, <http://web.lexis-nexis.com>.

March 1994

The Clinton administration unveils proposals to try and induce India and Pakistan to abide by a regional nuclear arms control regime. The proposal aims at persuading India and Pakistan to end unsafeguarded production of fissile material; head off a regional nuclear arms race by agreeing to abide by a policy of non-deployment of nuclear capable missile systems; and agreeing to attend an international conference to address regional and global arms control and disarmament issues.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 341.

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28 February-2 March 1994

Arms control experts from India, China, Pakistan, and the United States meet in Shanghai at the four-country conference on arms control, and regional and global measures to avert nuclear and missile proliferation in South Asia. The conference is sponsored by the Federation of American Scientists, Center for Policy Research (New Delhi), and Fudan University (Shanghai). The second round of the four-country meeting is planned to be held in New Delhi at the end of 1994. Participants at the conference reach a consensus on the issue of the necessity of a bilateral agreement banning nuclear testing between India and Pakistan. The participants also call for further cuts in the US and Russian nuclear arsenals.

—"Four-Nation Meeting Calls for India-Pakistan Nuke Test Ban," United Press International, 3 March 1994; in Lexis-Nexis Academic Universe, 4 March 1994, <http://web.lexis-nexis.com>.

15 February 1994

Responding to the CBS television program 60 Minutes, which charged India with operating "the most unsafe nuclear plants in the world," Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says the US television network has "deliberately and seriously" distorted the factual information on nuclear safety issues in India. He emphasizes that safety regulatory systems and procedures are "well in place and implemented effectively."

—"Atomic Energy Regulatory Board 'Deeply Disturbed' by 'Distorted' US Programme," BBC Summary of World Broadcasts, 18 February 1994; in Lexis-Nexis Academic Universe, 14 January 1994, <http://web.lexis-nexis.com>.

12 February 1994

Atomic Energy Regulatory Board (AERB) Chairman A. Gopalakrishnan says India will employ new safety measures to ensure greater safety at its nuclear installations. The measures will include surprise checks and increased surveillance at nuclear sites, and industrial and medical centers where radioactive materials are used. He adds that new nuclear plants will not begin operation "until the plant workers receive intensive training on simulator plants to meet international standards."

—"India to Conduct Surprise Safety Checks at Nuclear Sites," United Press International, 12 February 1994; in Lexis-Nexis Academic Universe, 13 February 1994, <http://web.lexis-nexis.com>.

12 February 1994

The Rajasthan Atomic Power Station-1 (RAPS) is shut down for "affecting the repair of its calandria overpressure relief device" which resulted in the leakage of heavy water.

—R. Ramachandran, "Rajasthan Atomic Power Plant to Be Shut Down for Three Years," *Economic Times* (Mumbai), 22 May 1995.

January 1994

Indian and Pakistani foreign secretaries meet to discuss proposals for confidence-building measures and other political issues. Both countries agree to prepare non-papers on an array of subjects including nuclear issues.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 340.

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24 January 1994

Atomic Energy Commission (AEC) Chairman R. Chidambaram says that India has voluntarily offered to place the Tarapur 420MW reactors and a fuel reprocessing plant under international inspections in order to "demonstrate to the world that we have no intention of using the reprocessed plutonium for anything other than running the power station." He says India will sign a new agreement with the International Atomic Energy Agency (IAEA) [Note: See entry for 16 October 1993.]

—Neelam Jain, "India to Sign a New Safeguard Agreement for US-built Atomic Plant," United Press International, 24 January 1994; in Lexis-Nexis Academic Universe, 25 January 1994, <http://web.lexis-nexis.com>.

17 January 1994

Japan's foreign ministry announces that in recent bilateral talks with India, Japan urged India to join the NPT and open up its nuclear facilities for IAEA inspection in order "to improve transparency of its nuclear development plans." Transparency of India's nuclear program is important for Japan since India is one of the largest recipients of its Official Development Assistance (ODA). ODA guidelines require that Japan take into account the receiving country's military expenditure, production, import and export of conventional weapons, missiles and weapons of mass destruction.

—"Japan Urges India to Join NPT, Accept Inspections," Japan Economic Newswire, 17 January 1994; in Lexis-Nexis Academic Universe, 14 January 1994, <http://web.lexis-nexis.com>.

13 January 1994

A senior representative of India's nuclear establishment says India is planning to shut down its CIRUS research reactor for a period of one year for renovation purposes.

—"UPI Spotlight India to Shut Down Plutonium Reactor for One Year," United Press International, 13 January 1994; in Lexis-Nexis Academic Universe, 14 January 1994, <http://web.lexis-nexis.com>.

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1993**1993**

Mid-level diplomats from the Ministry of External Affairs reportedly bypass the official delegation at the Conference on Disarmament (CD), Geneva and the Indian embassy in Washington to arrive at a nonproliferation deal with the US State Department. The Indian offer includes proposals for Indian tests and the willingness to negotiate a future global nonproliferation order; India's preparedness to discuss a regional nonproliferation regime linked to the nuclear weapon states agreeing to reduce their nuclear arsenals, but not within any given time frame; and the United States writing a protocol to the NPT or adopting alternative diplomatic means to accord countries such as India with proven nuclear capabilities.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 372-373.

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1993

The Indian Army regiment tasked with maintaining the Pokhran nuclear test site in the Rajasthan desert caps one of the deeper test shafts built in 1982.

—Raj Chengappa, "Tell Your President, I Keep My Word," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 394.

December 1993

The Atomic Energy Regulatory Board (AERB) sets up a Directorate of Regulatory Inspection and Enforcement for the surveillance of nuclear installations, as well as industrial and medical centers using radioactive material.

—Neelam Jain "Expert Warns India of Nuclear Scrutiny," United Press International, 22 March 1995; in Lexis-Nexis Academic World, 22 March 1995, <http://web.lexis-nexis.com>.

16 December 1993

Indian minister Bhuvanesh Chaturvedi states in parliament that "certain deficiencies" had been found in India's current turbine-generator technology. He adds that the government has asked Bharat Heavy Electricals Ltd, which produces turbine generators for the Nuclear Power Corporation (NPC), to upgrade its technology and bring it "on par with the best available in the world."

—"India to Upgrade Turbine Generator Technology after Nuclear Accident," United Press International, 16 December 1993; in Lexis-Nexis Academic Universe, 17 December 1993, <http://web.lexis-nexis.com>.

16 October 1993

Director-General of the International Atomic Energy Agency (IAEA) Hans Blix announces in Mumbai that the IAEA and India have bilaterally agreed to extend the Tarapur safeguards arrangement until December 1993. This temporary arrangement replaces the tripartite agreement between India, the IAEA, and the United States, which expires on 24 October. According to India's AEC Chairman R. Chidambaram, India has "entered in this arrangement voluntarily as a confidence-building measure" and by the time temporary bilateral arrangement expires, India plans to finalize an agreement with the IAEA.

—Vithel Nadkarni, "Interim Pact on Tarapur Reached with IAEA," *Times of India* (Mumbai), 17 October 1993; in FBIS Document JPRS-TND-93-038, 29 December 1993.

1 October 1993

Speaking at the 12th Plenary Meeting of the 48th Session of the UN General Assembly, India's Minister for External Affairs Dinesh Singh says that India welcomes the unilateral decision of the United States "to extend moratorium on nuclear testing until the end of 1994." He points out that "the focus of the nuclear weapon powers should now be on the early conclusion of a universal, verifiable, and comprehensive nuclear test ban treaty leading to the elimination of all nuclear weapons." He emphasizes that India believes in an early consideration of "a new and uniformly applicable regime for nonproliferation which does not discriminate between the nuclear weapon and non-nuclear weapon States." Singh points out that "for nuclear nonproliferation to be truly meaningful, it must also address the questions of a convention on the non-use of nuclear weapons, a verifiable freeze on the production of fissionable material, a total ban on nuclear weapon tests and negotiations on general and complete disarmament." He adds that "the global spread and reach of nuclear weapons reduce to a travesty the objective of

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achieving genuine peace and security within a narrow regional framework." Singh also touches the issue of export controls, emphasizing that actions should be taken to prevent the export control regimes from impeding the development. He argues that developing countries should have access to critical technologies and dual-use items to be employed for peaceful purposes.

—Dinesh Singh, Speech at the 12th Plenary Meeting of the 48th Session of the UN General Assembly, 1 October 1993; in Ministry of External Affairs, Government of India, <http://www.meadev.nic.in>.

15 September 1993

Indian and US officials begin their third round of discussions on nonproliferation issues in Washington. During the talks, Indian officials reject US requests for resumption of an Indo-Pakistani nuclear dialogue, as well as the idea of a five nation conference to discuss nonproliferation issues. However, India expresses interest in a global ban on fissile material production for explosive purposes, so long as the proposed treaty does not require countries to surrender acquired fissile material. Indian and US officials also discuss the issue of nuclear fuel supply for the Tarapur nuclear power reactors. The Indo-US nuclear fuel supply contract is due to expire in October 1993 and France the substitute supplier has declared its inability to continue the supply of nuclear fuel due to its acceptance of full-scope safeguards requirements for any foreign country to which it exports sensitive nuclear technology or material. In light of Indian difficulties, US officials assure their counterparts that Washington will try and find an alternative fuel supplier. However, they also warn Indian officials that pressure would be exerted on India if it proceeds to reprocess the fuel originally supplied by the United States or abandons safeguards on the Tarapur reactors.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), pp. 337-338.

Early September 1993

UPI news agency reports that India and the United States will reopen talks on the subject of the "emerging nuclear arms race in South Asia" on 15 September in Washington. India's Foreign Secretary J.N. Dixit will lead the Indian delegation.

—"US-Indian Nonproliferation Talks to Begin Next Week," United Press International, 10 September 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

16 August 1993

Citing "well placed commercial and government sources," *Nuclear Fuel* reports that India intends to supply South Korea with "a large amount of heavy water for the Wolsong-2 PHWR" and Argentina with the heavy water for its Atucha-2 PHWR.

—Mark Hibbs, "India, China Seek to Crack Seoul's Heavy Water Market," *Nuclear Fuel*, 16 August 1993; in Lexis-Nexis Academic Universe, 10 September 1993, <http://web.lexis-nexis.com>.

8 July 1993

The Indian government reiterates that it will not sign the NPT despite the mounting pressure from France, which announced it would not renew a nuclear fuel contract for the Tarapur Atomic Power Station (TAPS), due to expire in October 1993, unless India accedes to the NPT.

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—"India Firm against Nuclear Treaty," United Press International, 8 July 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

8 July 1993

The Atomic Energy Regulatory Board (AERB) asks the Nuclear Power Corporation (NPC) to shut down seven nuclear power plants for "a thorough inspection of the turbines and generators and their associated components." According to the AERB officials, this is a precaution in light of the deficiencies revealed by investigations into the causes of the fire at Narora on 31 March. The experts investigating the fire at Narora say a combination of "fatigue failure [of two stream turbine blades and] deficiencies in the cabling system" resulted in the loss of electric power supply, which could have been avoided if AERB's recommendations to segregate cables and provide fire barriers had been followed. NPC will begin closures on July 31, starting with unit one of the Madras Atomic Power Station (MAPS).

—"India to Close Atomic Stations for Inspection," Agence France Presse, 8 July 1993; in Lexis-Nexis Academic Universe, 8 July 1993, <http://web.lexis-nexis.com>; "India: Phased Closure of Nuclear Plants for Safety Inspection," Inter Press Service, 16 July 1993; in Lexis-Nexis Academic Universe, 9 July 1993, <http://web.lexis-nexis.com>; Krishnan Guruswamy, "Accident Forces India to Shut Down Nuclear Plants for Inspection," Associated Press, 9 July 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; Shiraz Sidhva, "India Orders Closure of N-reactors," *Financial Times* (London), 10 July 1993; in Lexis-Nexis Academic Universe, 11 July 1993, <http://web.lexis-nexis.com>.

July 1993

Former Atomic Energy Commission (AEC) Chairman P.K. Iyengar says some countries have approached India to contract for its heavy water supplies.

—Mark Hibbs, "India, China Seek to Crack Seoul's Heavy Water Market," *Nuclear Fuel*, 16 August 1993; in Lexis-Nexis Academic Universe, 10 September 1993, <http://web.lexis-nexis.com>.

July 1993

During a visit to India, Kazakhstan Deputy Prime Minister G.A. Abilsyitov offers to supply enriched uranium pellets and uranium oxide to India. Indian government officials say they cannot treat the Kazakh offer seriously since Russia and the Western countries would object to the deal. Moreover, an agreement will have to include Russia since Kazakhstan does not have an indigenous enrichment facility.

—Neel Patri, "Indians Say Kazakh Uranium Offer Does not Resolve Tarapur Problem," *Nuclear Fuel*, 2 August 1993; in Lexis-Nexis Academic Universe, 26 August 1993, <http://web.lexis-nexis.com>.

9 June 1993

Bhabha Atomic Research Center (BARC) Director A.N. Prasad says India's nuclear program is "passing through a dark phase" due too technology control regimes. Prasad emphasizes the importance for Indian industry to "come forward and interact with BARC, which has the know-how for the required equipment" to develop the necessary components indigenously.

—"Top Official Says Western Embargo Hurting Indian Nuclear Program," United Press International, 9 June 1993; in

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Executive News Service, 9 June 1993; "Indian Nuclear Program 'Passing through Dark Phase' due to Embargo," BBC Summary of World Broadcasts, 11 June 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

Early June 1993

At the meeting of the International Atomic Energy Agency's (IAEA) International Working Group (IWG) on fast breeder reactors, director of the reactor group at the Indira Gandhi Center for Atomic Research (IGCAR) S.B. Bhoje says that financial constraints froze the construction of the 500MW Prototype Fast Breeder Reactor (PFBR) in India. He adds that "the immediate goal in [India's] fast breeder program is to commission the turbo-generator set [of India's 40MW (thermal)/13MW electric mixed-carbide-fuelled, sodium-cooled, loop type Fast Breeder Test Reactor and connect it to the grid]." He adds that FBR program in India will be finalized within the next two years, noting that some 1,500 scientists are working on the program that has a budget of 500 million rupees for 1993-94.

—Gamini Seneviratne, "Breeder Development Moves East as West Looks at Waste Disposal," *Nucleonics Week*, 17 June 1993; in Lexis-Nexis Academic Universe, 9 July 1993, <http://web.lexis-nexis.com>.

12 May 1993

India's Atomic Energy Regulatory Board (AERB) reports 147 "safety-related, unusual occurrences" at India's nuclear power plants during 1992. The report states that in five cases employees were killed but no radiation leakage was detected outside any of the plants. The Department of Atomic Energy's (DAE) spokesperson says the Indian government has "not hidden any accidents and every effort is being made to see that our program remains accident free."

—Brahma Chellaney, "Agency Reports 147 Safety Incidents at Indian Nuclear Plants," United Press International, 12 May 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; Dilip Ganguly, "147 Accidents in India's Nuclear Plants Last Year," Associated Press, 17 May 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "India: Phased Closure of Nuclear Plants for Safety Inspection," Inter Press Service, 16 July 1993; in Lexis-Nexis Academic Universe, 9 July 1993, <http://web.lexis-nexis.com>.

6 May 1993

India's Comptroller and Auditor General (CAG) testifies before parliament and chastises the Department of Atomic Energy (DAE) for a 16-year delay and 570 million rupees cost overrun in India's Fast Breeder Test Reactor Program (FBTR). CAG says that neither the final cost of the project nor its completion date have yet been determined. According to the CAG's report, the 13MW FBTR located at the Indira Gandhi Center for Atomic Research (IGCAR), which was set to begin operation in 1976 at a cost of 340 million rupees, by March 1992 had run up a cost of 910 million rupees.

—"Auditor Unimpressed by FBR Delays," *Nuclear Engineering International*, July 1993, p. 8; "Kalpakkam Reactor Cost Up by Rs 57 Cr," *Times of India* (Mumbai), 14 May 1993; in *Strategic Digest*, July 1993, p. 1139.

5 May 1993

The Unit 1 reactor of the Kakrapar Atomic Power Station (KAPS) begins commercial operations. Total power generated from this reactor is estimated to reach 5,500 million units (MUs).

—Government of India, *Department of Atomic Energy Annual Report 1993-1994*, p. 4.

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April 1993

In a congressionally mandated report, the Clinton administration declares that nonproliferation will be the major issue in US relations with India and Pakistan. The US goal in South Asia is to "first cap, then over time reduce, and finally eliminate the possession of weapons of mass destruction and their means of delivery."

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 335.

26 April 1993

Speaking in Hyderabad, the Chief Executive of the Nuclear Fuel Complex (NFC) K. Balamamurthy says the NFC now has the expertise to produce sophisticated zircaloy tubes, "meeting the stringent technical specifications right from the raw material stage to the finished product." Canada, South Korea, Argentina, and Romania have expressed their interest in the NFC technology, he says. He adds that this year, India intends to export some of its technologies, apart from meeting the requirements for its nuclear power program. According to Balamamurthy, the NFC has developed an alternative route to supply fuel for the Tarapur Atomic Power Station (TAPS)— by using mixed oxide fuel. He says the technique was already standardized and could be used "at any moment." He adds that the NFC has prepared a "perspective growth plan to raise the production capacity of pressurized heavy water reactor fuel to about 1,000 tons per year and zircaloy to 160 tons per year by the end of 1993-94" in order to meet the target of 6,000MW by the year 2000. To achieve this target, the NFC plans four projects with a total investment of 70 billion rupees during the Eighth and Ninth Plan.

—"Plans Discussed," *Deccan Chronicle* (Hyderabad), 27 April 1993, p. 3; in FBIS Document JPRS-TND-93-022, 12 July 1993.

Early April 1993

Managing Director of the Nuclear Power Corporation (NPC) tells the PTI news agency that the fire at Narora resulted in a "complete power outage for more than 10 hours, disabling the reactor's primary and secondary cooling systems. [However, the plant's] passive cooling system was able to carry away the heat from the reactor core." Executive Director of the Atomic Energy Regulatory Board (AERB) S.V. Kumar says "no plant workers were killed or injured and there was no radiation hazard to either the staff or the public." AERB "provisionally" classifies the event at Level 3 on the International Atomic Energy Agency's (IAEA) International Nuclear Event Scale (INES). According to Atomic Energy Commission (AEC) Chairman R. Chidambaram, the turbine generator can be fixed within four months.

—Neel Patri, "NAPS-1 Turbine Generator Wrecked; Fire Damage Will Take Months to Fix," *Nucleonics Week*, 8 April 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; Brahma Chellaney "Backup Cooling System Averted Indian Reactor Meltdown," *United Press International*, 4 April 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

31 March 1993

At 3.30 a.m. a fire breaks out in the turbine generator of the 235MW reactor at the Narora Atomic Power Station (NAPS). The fire rages on for 12 hours. According to the Department of Atomic Energy (DAE), the fire is directly linked to turbine blades in the generator that suddenly failed. The fire reportedly does not damage the reactor building and all the safety systems performed "as per design intent."

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—Government of India, *Department of Atomic Energy Annual Report 1993-1994*, p. 9; "Turbine in Nuclear Power Station Catches Fire," Associated Press, 31 March 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

25 March 1993

India's Minister of External Affairs Dinesh Singh denies that India was on the brink of nuclear war with Pakistan in 1990. He adds that India never had a "surreptitious nuclear program" and has never concealed its nuclear capability. Speaking about India's reaction to North Korea's decision to withdraw from the NPT, Singh says that this development only reinforces India's argument that the treaty is discriminatory and that no "bilateral or sectoral" agreements to contain proliferation will work unless there is "a global arrangement."

—"India Denies Reports on Indo-Pak Nuclear War," Japan Economic Newswire, 25 March 1993; in Lexis-Nexis Academic Universe, 25 March 1993, <http://web.lexis-nexis.com>.

22 March 1993

A top Pakistani government official denies the allegations in Seymour Hersh's *New Yorker* story that India and Pakistan were on the brink of nuclear war in 1990.

—Ranjan Roy, "News Report Denied of Nuclear Standoff between India, Pakistan," Associated Press, 22 March 1990; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

22 March 1993

Citing US government and intelligence sources, Seymour Hersh writes an investigative piece for *New Yorker* in which he alleges that in 1990, India and Pakistan were on the verge of nuclear war. According to Hersh, the US intelligence satellites picked up "intense increase in Pakistan radar activity." Further, Pakistan's Air Force "stepped up its F-16 training to practice what seemed to be dropping a nuclear bomb." He cites German intelligence suggesting that "the Pakistanis had designed a nuclear warhead that could be fitted under the wing of an F-16, and that the design had gone through a series of wind-tunnel tests." Hersh further states that Pakistan "has learned to program its in-flight computer system to provide the correct flight path for a nuclear bomb run." Hersh remarks that in the early spring of 1990 the US government discovered that Pakistan's Chief of Army Staff General Beg "had authorized the technicians at Kahuta to put together nuclear weapons [and] was prepared to use the bomb against India if necessary." In May 1990, US satellites registered evacuation of the Kahuta uranium enrichment facility. He further notes that Pakistan had "F-16s pre-positioned and armed for delivery — on full alert, with pilots in the aircraft." However, Hersh also cites US Ambassador to Pakistan Robert Oakley saying that there was not "any hard evidence that any nuclear warheads had been delivered to an airbase. ISI [Inter-Services Intelligence] was putting out all sorts of messages, but we had no evidence that a nuclear exchange was imminent."

—Seymour Hersh, "On the Nuclear Edge," *New Yorker*, 29 March 1993, pp. 56-73.

24 March 1993

India's Minister of External Affairs Dinesh Singh states in parliament that India will never sign the NPT because it is highly discriminatory and attempts to create "a permanent division between the nuclear haves and have nots." According to Singh, former US President George Bush, Russian President Boris Yeltsin, British Prime Minister John Major, Japanese Prime Minister Kiichi Miyazawa, and German Chancellor Helmut Kohl urged India to join the NPT.

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Singh says that the Prime Minister Narasimha Rao told these leaders that India "could not sign the treaty because the NPT places arms control curbs only on the non-nuclear states, not on the five acknowledged nuclear weapon powers."

—"India Vows Never to Sign Nuclear Nonproliferation Treaty," United Press International, 24 March 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

11 March 1993

India's federal government does not increase budget allocations for the nuclear power sector in the fiscal year 1993-94. The new budget provides 9.5996 billion rupees as against the 9.593 billion rupees allocated during 1992-93.

—Neel Patri, "Indian Budget Gives No Increase in Nuclear Plant Building Money," *Nucleonics Week*, 11 March 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

3 March 1993

The Japanese foreign ministry announces that Japan will hold talks with India on preventing the spread of nuclear weapons. The Japanese Ambassador for Arms Control and Disarmament Mitsuro Donowaki and India's Foreign Secretary J.N. Dixit will lead their respective delegations. The two sides plan to discuss "the present situation of India's nuclear power development, security in Asia and regional efforts for nuclear nonproliferation in Southwest Asia."

—"Japan and India to Talk on Spread of Nuclear Weapons," United Press International, 3 March 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "Japan-India Nuke Talks Slated for March 12," Jiji Press Ticker Service; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

March 1993

Citing continuing safety lapses in India's nuclear program, the *Indian Express* reports that a "self-serve aluminum ball" was recently found in a desk drawer at the Bhabha Atomic Research Center (BARC); the ball emitted a radiation field of "2 rads per hour," the "maximum permissible exposure for a worker in the radiation unit for an entire year." Subsequent investigations found no inventory for these balls, which puts a question mark on how many balls may have been lost. If such balls, which measure about two centimeters in size, were indeed lost, they could pose a severe radiation hazard to unshielded workers.

—Sumit Ghoshal "Series of Near Accidents Cast Doubts on Safety at BARC," *Indian Express* (Mumbai), 17 July 1996, www.expressindia.com.

26 February 1993

India begins a dialogue with France on arms control and disarmament issues.

—"India, France Discuss New Delhi's Opposition to NPT," United Press International, 26 February 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

24 February 1993

US Central Intelligence Agency (CIA) Director James Woolsey testifies before Congress that "the arms race between India and Pakistan poses perhaps the most probable prospect for future use of weapons of mass destruction,

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including nuclear weapons." Woolsey asserts that both India and Pakistan are capable of assembling nuclear weapons on short notice.

—Cited in, George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 335.

17 February 1993

Director of the reactor group at the Indira Gandhi Center for Atomic Research (IGCAR) S.B. Bhoje says that the design work on the 500MW prototype fast breeder reactor to be constructed near Chennai is close to completion.

—Brahma Chellaney "India to Complete Building Plutonium Breeding Reactor," United Press International, 17 February 1993; in Lexis-Nexis Academic Universe, 22 October 1993 <http://web.lexis-nexis.com>.

12 February 1993

Japan's foreign ministry announces that Japan and India will discuss the issue of nuclear nonproliferation during talks in New Delhi in mid-March. According to the ministry officials, Japan will express its desire to see India join the NPT.

—"Japan, India to Hold Talks on Nuclear Nonproliferation," Japan Economic Newswire, 12 February 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; Anwar Iqbal "Japan to Lobby Pakistan, India on Nuclear Issue," United Press International, 23 February 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

February 1993

German Chancellor Helmut Kohl announces in New Delhi that Germany will hold discussions with India to persuade it to sign the NPT, which he calls "a treaty of enormous significance."

—"India, France Discuss New Delhi's Opposition to NPT," United Press International, 26 February 1993; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

Late January-Early February 1993

Former Chairman of the Atomic Energy Commission P.K. Iyengar is appointed head of a government committee tasked with recommending the future course for India's nuclear weaponization program. The committee recommends that nuclear tests be approved; in lieu of tests, the government kept the nuclear option open.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security* (Delhi: Macmillan India Limited, 2002), p. 370.

January 1993

Citing safety lapses and serious defects in the work system at the research reactors at the Bhabha Atomic Research Center (BARC), *Indian Express* reports that in January 1993 the Dhruva research reactor was operated with "fewer than [the] stipulated number of staff."

—Sumit Ghoshal "Series of Near Accidents Cast Doubts on Safety at BARC," *Indian Express* (Mumbai), 17 July 1996, www.expressindia.com.

12 January 1993

The spokesperson for India's Ministry of External Affairs Shiv Mukherjee says that the START-2 agreement, signed by the United States and Russia, "should be followed up with a multilateral agreement on elimination of all nuclear

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weapons" in a specific timeframe. He adds that the five nuclear weapons states should agree "to a universal ban on further testing and manufacture of nuclear weapons as a first step toward comprehensive nuclear disarmament." According to Mukherjee, India would urge all countries to begin negotiations "for an agreement to prohibit use, or threat to use, nuclear weapons." He says that there is "a compelling need for nuclear weapon states to reexamine the doctrines of nuclear deterrence..., used in the past to justify the expansion of their nuclear arsenals" and halt a continued modernization of these arsenals.

—"India Calls for Global Ban on Nuclear Testing," United Press International, 12 January 1993; in Lexis-Nexis Academic Universe, 12 January 1993, <http://web.lexis-nexis.com>; "India Welcomes START II Treaty," Japan Economic Newswire, 12 January 1993; in Lexis-Nexis Academic Universe, 12 January 1993, <http://web.lexis-nexis.com>.

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1992

1992-1993

A heavy water enrichment plant is commissioned at the Hazira Heavy Water Plant. This new enrichment facility will reportedly allow the Hazira Plant to upgrade 50 to 60 percent of its heavy water to a reactor grade level of 99 percent or better.

— Government of India, "Department of Atomic Energy Annual Report 1992-1993," p. 3.

1992-1993

Although the Department of Atomic Energy (DAE) meets the heavy water requirements for its new nuclear power stations, the Talcher Heavy Water Plant's output is heavily restricted. This is reportedly due to the poor performance of a local fertilizer plant that supplies some of its inputs.

—Government of India, "Department of Atomic Energy Annual Report 1992-1993," p. 11.

1992

Prime Minister P.V. Narasimha Rao reportedly authorizes Foreign Secretary J.N. Dixit to inform the US government that India will most likely conduct nuclear tests no later than 1992-93. The message is conveyed among others to the Secretary of State Madeline Albright, Undersecretary of State for Policy Peter Tarnoff, and the Ambassador-at-large at the State Department Thomas Pickering. The Indian government demands that in return for not springing surprises on the Clinton administration and communicating clarity of purpose, the United States avoid imposing economic sanctions on India. Tarnoff and Pickering inform Dixit that the Indian government should not inform Washington of its proposed actions beforehand as the US government will be compelled to act to stop the tests. Pickering also assures Dixit that the United States will not use force in the event India conducts nuclear tests, but that it has other means to take action against India.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security* (Delhi: Macmillan India Limited, 2002), pp. 369-370.

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1992

India claims that it has fabricated stainless steel vessels for interim storage of highly radioactive waste solution in corrosive medium. The last of the five vessels will be installed at the Fuel Reprocessing Plant at IGCAR (Kalpakkam).

—"Reprocessing Facility: First for India," *Nuclear Engineering International*, August 1992, p. 51.

28 December 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says the target for nuclear power production is lowered to 5,800MW of electricity by the turn of the century.

—Brahma Chellaney, "India Cuts Its Nuclear Power Production Target by Almost Half," *Compuserve-Executive News Service*, 28 December 1992.

Early December 1992

The NBC reports that Pakistan assembled seven nuclear devices during the 1989-1990 crisis with India. The report evinces an anxious response from Indian parliamentarians who demand that the Indian government explain how India's nuclear policy will be tailored in light of this revelation.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 333.

Early December 1992

The Department of Atomic Energy (DAE) orders "developmental studies" of technology to compensate for the loss of low-enriched uranium from France for the two boiling water reactors at the Tarapur Atomic Power Station (TAPS). The Minister of State for External Affairs Eduardo Faleiro says in the parliament that India is "ironing out" differences on the NPT with the United States, China, and Pakistan "with the view to evolving [a] national consensus."

—Neel Patri, Ann MacLachlan and Rauf Siddiqi, "India Mulling Over for Tarapur Fuel if France Cuts Supply After 1993," *Nucleonics Week*, 7 December 1992, pp. 14-15.

30 November 1992

Indian *Journal of Cancer* releases a study that indicates that the incidence of leukemia in males from Western Rajasthan is 5.2 percent, compared to the world average of 3.2 percent for men. The study argues that the incidence of bone and skin cancer is higher in Western Rajasthan than in any other part of India. Dr. R.G. Sharma suggests that India's nuclear test of 1974 at Pokhran is the cause of high incidence of cancer in the region.

—"Doctors Suspect Nuclear Test Cause of Cancer in Indian State," *United Press International*, 30 November 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

24 November 1992

India's new 220MW PHWR at Kakrapar begins generating electricity.

—"India's Newest Nuclear Power Reactor Starts Operating," *United Press International*, 24 November 1992; in Lexis-Nexis Academic Universe, www.lexis-nexis.com.

Mid-November 1992

Prime Minister Narasimha Rao states in parliament that nuclear policy is the key area of national consensus in

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India and no external pressures can sway India's stand on the issue.

—Brahma Chellaney "India Rejects US Proposal to Halt Producing Bomb..." Compuserve-Executive News Service, 16 November 1992.

15 November 1992

The spokesperson for the French Ministry of External Affairs M. Gourdault-Montagne says France will continue to supply low-enriched uranium to the Tarapur Atomic Power Station (TAPS) in India in 1993 since India is committed to the principle of nonproliferation and desists from building nuclear weapons even though it possesses the know-how. He adds that France will plead to the other nuclear weapon powers to include India in any emerging safety regime aimed at preventing the diversion of nuclear and missile technologies for military purposes. According to the spokesperson, France understands India's position on the NPT as an unrealistic treaty and that India cannot be pressured into signing the document as negotiations on the future of the treaty commence next year. He says that France and India will have regular consultations on the NPT and the Missile Technology Control Regime (MTCR).

—"French Supply of Nuclear Fuel to Continue," *Hindu* (Chennai), 16 November 1992, p. 1; in FBIS Document JPRS-TND-92-046, 11 December 1992.

12-13 November 1992

During Indo-US talks in Washington, the US team proposes that India halt fissile material production either unilaterally or through a bilateral agreement with Pakistan. India rejects the proposal. A senior official at the Indian Ministry of External Affairs says India cannot accept a regional freeze that prohibits fissile material production; any such freeze should be nondiscriminatory and applicable to all nations. US State Department spokesperson Richard Boucher says the talks with India were "intended not to produce a specific agreement but to explore concrete ideas for reducing tensions and avoiding conflicts." According to Boucher, the talks included "discussions of possible confidence- and security-building measures and ways to halt the proliferation of chemical and nuclear weapons and ballistic missile systems."

—Brahma Chellaney "India Rejects US Proposal to Halt Producing Bomb..." Compuserve-Executive News Service, 16 November 1992.

30 October 1992

The Atomic Energy Commission (AEC) and the Ministry of External Affairs reject Norway's allegation that consignments of heavy water headed to Germany and Romania ended up in India. Both agencies claim that India produces a sufficient amount of heavy water. AEC Chairman P.K. Iyengar says India exported 11 tons of heavy water to Belgium in 1965 and presently has about 500 tons in surplus.

—"India: Norwegian Heavy Water Has Not Been Diverted to India," Inter Press Service, 30 October 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

20 October 1992

The Indian government announces it will resume the talks with the United States on 12-13 November in Washington, DC.

—Brahma Chellaney, "India to Resume Nuclear Talks with US despite Internal Criticism," United Press International, 20 October 1992; in Lexis-Nexis Academic Universe, www.lexis-nexis.com.

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14 October 1992

Indian defense minister Sharad Pawar visits Ukraine to hold talks on arms supplies. Indian officials say that India is interested in buying Ukrainian nuclear-powered or conventional diesel-electric submarines and tactical boats.

—Brahma Chellaney, "Indian Defense Minister to Shop for Arms in Ukraine," Compuserve-Executive News Service, 13 October 1992.

Early October 1992

Prime Minister of India Narasimha Rao fails to convince France to continue the supply of low-enriched uranium for the two Tarapur boiling water reactors. Atomic Energy Commission (AEC) Chairman P.K. Iyengar says, however, that there is an alternative way to supply fuel for the reactors by either using domestically produced mixed-oxide fuel or domestically produced enriched uranium. Iyengar says, however, that no decision has been made yet to use the enrichment facility at Rattehalli (Karnataka) to enrich uranium for Tarapur reactors.

—Neel Patri and Ann MacLachlan, "Iyengar Says India Can Make Fuel for Tarapur as French Rebuff Rao," *Nucleonics Week*, 8 October 1992, p. 12.

Late September 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says the deal with the Russian Federation for the supply of the two VVER-1,000 reactors is "virtually aborted" because the "Russian federation simply does not have the capital" to fund the project. According to Iyengar, the most attractive condition of the deal with Russia was a deferred payment plan. Iyengar adds that lower budget allocations this year will cause a slow-down in the AEC's nuclear plant construction program. Iyengar notes that ongoing work on the pressurized heavy water reactors' construction continues uninterrupted and Kakrapar-2, Kaiga-2, and Rajasthan-2 reactors are on schedule. Iyengar underlines that the cuts in the financing from the federal government and involvement of state governments and private companies in nuclear power plant construction does not mean that India's nuclear program is undergoing privatization. He says the nuclear program will continue to be run by AEC due to the "special requirements of nuclear technology."

—Neel Patri, "Lack of Capital Deters Russians from Building VVERs in India," *Nucleonics Week*, 1 October 1992, pp. 10-11.

28 September 1992

Addressing a news conference in New Delhi, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India has the capability to produce nuclear weapons as quickly as needed. He remarks that India is self-reliant in nuclear technology and is not vulnerable to outside pressure.

—Shikha Bose, "Top Official Says India Can Quickly Produce Nuclear Bomb," United Press International, 28 October 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

28 September 1992

Prime Minister of India Narasimha Rao leaves for France, where he plans to request that French President Francois Mitterand extend the fuel contract for the supply of low-enriched uranium to the Tarapur Atomic Power Station (TAPS). The lifespan of the two Tarapur reactors ends in 1993 along with the fuel supply contract, but the Department of Atomic Energy (DAE) expects them to run for another ten years. DAE expects to run the reactor

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with mixed-oxide fuel containing plutonium from the reactors' spent fuel.

—Brahma Chellaney, "India to Urge France to Extend Nuclear Fuel Contract," Compuserve-Executive News Service, 28 September 1992; "Tarapur Considers Ten More Years," *Nuclear Engineering International*, October 1992, p. 3; "Commentary on Rao's Visit to France, Uranium Transfers," Delhi All India Radio Network, 25 September 1992; in FBIS Document JPRS-TND-92-036, 7 October 1992, p. 12.

25 September 1992

Delivering a lecture on national security in New Delhi, former Chief of the Army Staff General Sundarji says India must have limited nuclear deterrence in case of a nuclear strike against it.

—"Former Army Chief on Limited Nuclear Deterrence," Delhi All India Radio Network, 25 September 1992; in FBIS Document JPRS-TND-92-036, 7 October 1992, p. 12.

19 September 1992

A spokesperson for India's Ministry of External Affairs says that India will resume talks on regional nuclear nonproliferation with the United States on 3-4 November 1992.

—"India-US Nuclear Talks Scheduled for Early November," United Press International, 19 September 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

11 September 1992

Indian Express reports that the Dhruva and CIRUS research reactors, which use water from Arabian Sea as a secondary coolant, discharge the radioactive waste back into the sea. A Bhabha Atomic Research Center (BARC) official denies the allegation as an "exaggerated portrayal... by workers."

—"Indian Plutonium-producing Reactors Said to Have Leaked Radioactivity," United Press International, 11 September 1992; in Lexis-Nexis Academic Universe, 12 January 1992, <http://web.lexis-nexis.com>.

7 September 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says the government released only \$53 million out of planned \$318 million allocated for nuclear power projects. He remarks that the NPC is undergoing a major resource crisis. He adds that India's nuclear program will definitely slow down "but it won't come to a screeching halt."

—"India's Nuclear Power Program Hit by Economic Crisis," United Press International, 7 September 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

4 September 1992

An Indian government official says that Defense Minister Sharad Pawar will express interest in buying advanced nuclear powered submarines when he meets Russian President Boris Yeltsin next week. Pawar will discuss the possibilities of acquiring submarine launched missiles, electronic warfare equipment, and the latest version of MiG-29 fighter jets. The minister will also discuss the disruption in the supply of Russian components to the Indian military production complex manufacturing Soviet-model weapon systems under license.

[Note: India leased a Russian *Charlie I*-class nuclear submarine *Chakra* in 1988 for training purposes for a period of three years. India returned the submarine to Russia after the expiry of the lease in early January 1991.]

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—Brahma Chellaney, "India Seeks Nuclear Submarine from Russia," Compuserve-Executive News Service, 4 September 1992.

3 September 1992

The Department of Atomic Energy (DAE) announces that the Unit 1 220MW pressurized heavy water reactor (PHWR) of the Kakrapar Atomic Power Project (KAPP) has achieved criticality. India's installed nuclear power production capacity thereby reaches 1,720MW. According to DAE's press release, the second PHWR at Kakrapar is expected to be commissioned in 1993. KAPP uses indigenously produced natural uranium as fuel and heavy water as moderator and coolant.

—Government of India, "Department of Atomic Energy Annual Report 1992-1993," p. 9; "India's New Reactor Commissioned," Xinhua General Overseas News Service, 3 September 1992; in Lexis-Nexis Academic Universe, 4 September 1992, www.lexis-nexis.com.

1 September 1992

A British documentary, *Nuclear India: A Dream Gone Sour*, chronicles India's gross neglect towards nuclear safety and the secrecy that surrounds its nuclear program. Safety of the workers and local population at the sites of India's nuclear installations is ignored, the report says. Despite its 40-year history, nuclear power accounts for only two percent of electricity in India. Dharendra Sharma, professor at Jawaharlal Nehru University (New Delhi), claims the main purpose of India's nuclear program is production of weapons-grade plutonium.

—Raymond Whitaker "India Ignores Nuclear Safety," *Independent*, 1 September 1992; L.K. Sharma "Indian N-Plant Gets Bad Coverage in UK Film," *Times of India* (Mumbai), 3 September 1992, p. 16.

Late August 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says he will begin a dialogue with public and private sector companies in India to form joint ventures in the field of nuclear power generation and other nuclear technologies. According to Iyengar, the government-owned Bharat Heavy Electricals Ltd. and the private sector Larsen & Toubro Ltd. that produce about 60 percent of equipment for the nuclear power plants can "now help the corporation [Nuclear Power Corporation] in forming its capital base and share the equity." He says the private companies may be offered equity in new nuclear units at Rajasthan, Kaiga, and Tarapur. Pending a formal decision, Nuclear Fuel Complex (Hyderabad) signs a memorandum of understanding with Tata Oil Company for the production of zirconium and titanium salts in a three-billion-rupees plant to be constructed at Palaikad (Tamil Nadu).

—"India Eyes Joint Ventures with Nuclear Plant Vendors," *Nucleonics Week*, 27 August 1992, pp. 5-6.

20 August 1992

Minister of Science and Technology R. Kumaramangalam says that "preliminary discussions have been initiated with the Russian Federation" to continue the project of two VVER-1,000 construction at Koodankulam (Tamil Nadu) in the new political situation.

—"India Eyes Joint Ventures with Nuclear Plant Vendors," *Nucleonics Week*, 27 August 1992, pp. 5-6.

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1 July 1992

Unit 2 reactor of the Narora Atomic Power Station (NAPS) begins commercial operations.

—Government of India, "Department of Atomic Energy Annual Report 1992-1993," p. 9.

24 June 1992

Addressing a press conference in Tokyo, Indian Prime Minister P.V. Narasimha Rao calls for modification of the NPT to include a time-bound framework for elimination of all nuclear weapons. He emphasizes that the Japanese government has not pressed India to sign the treaty.

—"Rao Reaffirms Intention Not to Sign NPT: Calls for Modified NPT," Delhi All India Radio Network, 21 June 1992; in FBIS Document JPRS-TND-92-020, 25 June 1992, p. 12.

20 June 1992

Speaking to a group of Japanese journalists, India's Prime Minister P.V. Narasimha Rao says India will not sign the NPT since the country believes in the total elimination of nuclear weapons.

—"Rao Reaffirms Intention Not to Sign NPT: Underlines Peaceful Purposes," Delhi All India Radio Network, 21 June 1992; in FBIS Document JPRS-TND-92-020, 25 June 1992, p. 12.

18-19 June 1992

India and the United States hold talks on nuclear proliferation in South Asia. During the meeting, the United States acknowledges Indian objections and requests New Delhi to propose alternatives for regional arm control initiatives. Indian representatives do not reject US proposals and offer to deliberate on alternative ways of convening a five-power conference to address regional and global security issues.

—"US Holds Non-Proliferation Talks with India," Associated Press, 18 June 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "Indo-US Talks on Nuclear Issues End," Xinhua General Overseas News Service, 19 June 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; Thomas Wagner "India Rejects US Proposal on Nuclear Weapons," Associated Press, 19 June 1992; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 329.

15 June 1992

Indian government denies a report published by *Sunday Times* (London) that the British firm GEC-Marconi had "secretly exported nuclear and missile technology to India, in conflict with government's commitment to halt the spread of strategic weapons." According to the export manager of Marconi, Allan Luskow, the firm tried to register equipment destined for the Bhabha Atomic Research Center (BARC) and the Defense Research and Development Organization (DRDO) as related to medical research. A spokesperson of the Ministry of External Affairs of India says the report is "inaccurate..., misleading, mischievous and malicious." According to the spokesperson, India had negotiations with this firm regarding some missile components since 1986 with the prior permission of the British government.

—"India Denies Report on British Nuclear Deal," Reuters, 15 June 1992; in Compuserve-Executive News Service, 17 June 1992; "Firm Said Exporting Nuclear Technology to India," *Muslim* (Islamabad), 15 June 1992, pp. 1, 12; in FBIS

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Document JPRS-TND-92-024, 21 July 1992; "Procurement of Nuclear Parts from UK Denied," Delhi All India Radio Network, 15 June 1992; in FBIS Document JPRS-TND-92-024, 21 July 1992, p. 16.

Early June 1992

H.N. Paul at the Indian Embassy in Oslo (Norway) tells reporters that "India has not received any Norwegian heavy water either from Norway or via other countries." This is India's final answer, he says.

—"Ministry Denies Receiving Norwegian Heavy Water," *Aftenposten* (Oslo), 9 June 1992, p. 2; in FBIS Document JPRS-TND-92-024, 21 July 1992.

29 May 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says AEC is planning to construct two 500MW pressurized heavy water reactors at Koodankulam (Tamil Nadu) where two Russia-supplied VVER-1,000 reactors were to be built. The deal with Russia on reactor construction has not been formally cancelled.

—"Confusion at Koodankulam," *Nuclear Engineering International*, August 1992, p. 7.

21 May 1992

China tests a huge one-megaton nuclear device while Indian President R. Venkataraman is on a state visit to China.

—Barbara Crossette, "Chinese Set Off Their Biggest Nuclear Explosion," *New York Times*, 21 May 1992, Section A, p. 1.

22 April 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says the Indo-Russian deal on the construction of two VVER-1,000 reactors in Koodankulam (Tamil Nadu) may fall apart due to Russia's insistence on dollar payments. Nevertheless, Russia is still interested in the deal. Iyengar says it is better that India rely on indigenous technology and resources rather than purchase reactors from others.

—"India May Not Get Russian N-Reactor," *Times of India* (Mumbai), 23 April 1992.

21 April 1992

Speaking to the UN disarmament commission, Indian representative Prakash Shah says India favors global disarmament as the only realistic solution to nuclear proliferation since regional and bilateral arrangements did not result in the quantitative and qualitative reduction of these weapons. Commending the agreement between the United States and Russia to cut certain categories of weapons in their nuclear arsenals, Shah says the fissile material from the decommissioned weapons should be placed under International Atomic Energy Agency (IAEA) safeguards and be used only for peaceful purposes. Shah commends the Action Plan suggested by India in 1988 to the UN special session on disarmament. The plan calls all nuclear weapon states to undertake equal obligations and provides for a phased elimination of the nuclear weapons. He urges countries that believe in the "ultimate elimination of nuclear weapons to make this plan workable."

—"India Restates Stand in N-Proliferation," *Times of India* (Mumbai), 23 April 1992, p. 4.

20-23 April 1992

S.K. Chatterjee, an executive director in charge of projects at the Nuclear Power Corporation (NPC), says the Indian government approved only 15 percent of the requested 9 billion rupees for ongoing projects during the fiscal year

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1992/93. According to Chatterjee, NPC is considering raising 7.5 billion rupees in loans to fund its projects. Criticism of the Department of Atomic Energy (DAE) grows both in the Parliament and within Rao's government due to cost and schedule overruns that plague the projects and low availability and capacity factors of the operating facilities. According to Chatterjee, India can hardly reach the new target of 5,700MW of nuclear energy by the year 2000.

—"Indian Government Giving NPC Just 15 % of Nuclear Building Budget," *Nucleonics Week*, 23 April 1992, pp. 4-5; "Foreign Financing for Indian DAE Hinges on Safeguards, US Says," *Nucleonics Week*, 30 April 1992, pp. 9-10.

15 April 1992

Shibdas Burman, a scientist at the National Institute of Science, Technology and Development Studies in New Delhi, publishes a study on India's CANDU-type nuclear reactors. According to the study, India's CANDU reactors are much safer than the Chernobyl nuclear power station and light water reactors in Western Europe.

—"India's Nuclear Reactors Safer: Study," Xinhua General Overseas News Service, 15 April 1992; in Lexis-Nexis Academic Universe, 16 April 1992, <http://web.lexis-nexis.com>.

Early April 1992

According to a senior French government official, France will discontinue supplies of low-enriched uranium for Tarapur Atomic Power Station (TAPS) unless India accepts full scope International Atomic Energy Agency (IAEA) safeguards. The Tarapur nuclear supply contract expires in 1993. [Note: The two 210MW reactors for the TAPS were supplied by the US firm General Electric under the 1963 India-US cooperation agreement, which expires in 1993. The reactors use low-enriched uranium as a fuel. In 1978, the US Congress passed the Nuclear Nonproliferation Act, under which India had to open all nuclear facilities to international inspection as a precondition for further fuel supplies. In 1982, the Reagan administration reached a compromise settlement and France took over as a fuel supplier. France is also bound by the requirement of full-scope safeguards since it is getting ready to adhere to the NPT.]

—"India Can't Count on France for Tarapur Fuel Past 1993," *Nucleonics Week*, 16 April 1992, pp. 9-10; "India," *Program for Promoting Nuclear Nonproliferation Newsbrief*, No. 18, Summer 1992, p. 4; in *Pacific Research*, August 1992, p. 28; Brahma Chellaney "India to Urge France to Extend Nuclear Fuel Contract," *Compuserve-Executive News Service*, 28 September 1992.

Early April 1992

The Atomic Energy Research Board (AERB) conducts a survey of social and physical scientists. The results indicate that 86 percent (out of 762 respondents) believe that nuclear power can supplement other energy resources. However, only 51 percent favor a large-scale nuclear power program to meet India's energy needs.

—"India: Some Surprises from Survey of Scientists," *Nucleonics Week*, 9 April 1992, p. 15.

April 1992

Indian Finance Minister Manmohan Singh allocates 10.08 billion rupees for the Department of Atomic Energy (DAE) in the budget for the fiscal year 1992/93, an increase of 1.12 billion rupees over the previous year.

—"Nuclear Wins Budget Allocation," *Nuclear Engineering International*, May 1992, p. 8.

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Late March 1992

The Dhruva research reactor located at the Bhabha Atomic Research Center (BARC) is shut down for fueling and maintenance. According to S.K. Sharma, associate director of the BARC reactor group, "Dhruva is routinely operated for four weeks, and then shut down for four to seven days for partial core refueling, maintenance, and experimental work." The reactor has been operating smoothly since 1987.

—Mark Hibbs, "Dhruva Operating Smoothly Within Refueling, Availability Limits," *Nucleonics Week*, 26 March 1992, pp. 8-9.

18 March 1992

Kirghiz President Askar Akaev publicly states that Kirghizstan has offered to supply enriched uranium to India under international safeguards. A spokesperson for Russia's Ministry of Atomic Energy reiterates, however, that all enrichment facilities of the former Soviet Union are located in Russia and, hence, Kirghizstan has only uranium milling equipment.

—"India/Kirghizstan: Uranium Offered," *Nuclear Fuel*, 30 March 1992, pp. 16-17; "Reports Continue on Exports of Uranium: Kyrgyz President Explains," *Izvestiya* (Moscow), 20 March 1992, Morning Edition, p. 1; in FBIS Document JPRS-TND-92-011, 15 April 1992, p. 11.

16 March 1992

Minister of State for External Affairs Eduardo Faleiro notifies the Parliament that India is ready to begin talks with the United States on nonproliferation issues in South Asia. The first round of talks will be held in May in New Delhi when a US delegation comes to explore the possibility of confidence-building measures. Faleiro confirms that India and the United States intend to conduct joint naval exercises in the Indian Ocean for the first time. He adds that India has put on hold a Pakistani proposal for a five-nation conference. India's new policy causes uproar among the opposition parties, who charge that the government has succumbed to US pressure.

—David Housego, "Indians Shift Stance on N-Weapons," *Financial Times*, 17 March 1992; Sanjoy Hazarika "India Moves to Improve Relations with US," *International Herald Tribune*, 16 March 1992.

Mid-March 1992

Atomic Energy Commission (AEC) Chairman P.K. Iyengar tells *Nucleonics Week* that a second gas centrifuge uranium enrichment facility is now operational. The facility is located at Rattehalli, close to Mysore (Karnataka). The facility consists of "several hundred operating centrifuges made of domestically produced maraging steel." According to Iyengar, India does not intend to start a large-scale production of centrifuges. India did not include this facility in the list of nuclear entities it presented to Pakistan.

—Mark Hibbs, "Second Indian Enrichment Facility Using Centrifuges is Operational," *Nucleonics Week*, 26 March 1992, pp. 9-10.

10-16 March 1992

In the aftermath of foreign secretary J.N. Dixit's visit to the United States, Indian opposition parties charge that the Rao government is succumbing to US pressure and is "losing its self-respect to the US." On 16 March 1992, the Minister of State for External Affairs Eduardo Faleiro states in parliament that there is no change in India's policy towards the NPT, but India is prepared to talk with the United States on nonproliferation issues.

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—Cameron Barr, "Indian Nod toward Nonproliferation Draws Fire at Home," *Christian Science Monitor*, 19 March 1992, p. 4.

9-10 March 1992

During his visit to Washington, DC, India's foreign secretary J.N. Dixit publicly states that although India has "the capacity to build and deliver a nuclear weapon," to his knowledge, it has not developed any yet and he does not know how long it will take to develop one. He denies reports that India has 60 nuclear warheads. According to Dixit, India's nuclear program is currently less advanced than that of Pakistan. He adds that closer relations with the United States will make India more receptive to the idea of a five-country conference to discuss nuclear proliferation on the subcontinent. He also says that such a conference "should not be conceived in a vacuum" and should address India's concerns over Chinese missiles and tactical nuclear weapons in Tibet and the status of such weapons in Kazakhstan. India will not accept the conference where "three powers outside the region tell [India] what to do." Dixit adds that India is ready to talk about the nonproliferation regime that is "global, nondiscriminatory and aimed at permanent eradication of nuclear weapons." He rejects the possibility of South Asian Nuclear Weapon Free Zone "when the whole region is bristling with nuclear weapons." The US State Department's report states that the two sides agreed "to continue discussions on ways to address the proliferation of weapons of mass destruction in South Asia."

—John Ward Anderson, "India Cool to US Call for Nuclear Talks," *Washington Post*, 11 March 1992, p. A24; Gus Constantine, "India Ready to Discuss Nuclear Arms Control with US," *Washington Times*, 11 March 1992, p. A8; Douglas Frantz and Norman Kempster, "India Warns US on Pakistan Arms Sales," *Los Angeles Times*, 11 March 1992, p. A19; Tim McGirk, "India Woos US with Promise of Nuclear Discussion," *Independent*, 13 March 1992; Anwar Iqbal, "Officials Call Meeting Over Indian Nuclear Plan," *News (Islamabad)*, 15 March 1992, pp. 1, 5; in FBIS Document JPRS-92-008, 26 March 1992; "India's Nuclear Posture Viewed," *Frontier Post (Peshawar)*, 15 March 1992, p. 10; in FBIS Document JPRS-92-008, 26 March 1992, p. 39.

7 March 1992

Bhabha Atomic Research Center (BARC) Director R. Chidambaram tells the *Washington Post* that India has not "stockpiled" or "deployed" nuclear weapons.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 327.

6 March 1992

Two 220MW pressurized heavy water reactor (PHWR) units planned for construction at Kaiga receive environmental clearance.

—"Nuclear Wins in Budget Allocation," *Nuclear Engineering International*, May 1992, p. 8.

March 1992

Former Atomic Energy Commission (AEC) Chairman M.R. Srinivasan says the collapse of the India-USSR deal for two VVER-1,000 reactors at Koodankulam (Tamil Nadu) does not mean that the reactors cannot be constructed with the help of the West. He says a deal with France is being negotiated. France requires that the facilities be under International Atomic Energy Agency (IAEA) safeguards. Finland is also considering to fill the vacuum created

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by Russia's withdrawal.

—"Indian PWR Not Yet Dead," *Nuclear Engineering International*, April 1992, p. 10.

March 1992

The Union Budget for the FY 1992 provides 8.098 billion rupees in allocations for the Department of Atomic Energy (DAE) and another 9.66 billion rupees for the nuclear power construction projects.

—"India Funds Nuclear Construction, Operations, and Research in FY-92," *Nucleonics Week*, 19 March 1992, pp. 9-10.

20 February 1992

During a lecture on nuclear science for national development in Bhubaneswar (Orissa), Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India's current nuclear energy generation capacity is 1,500MW. He remarks that with a "suitable strategy," India can increase its installed capacity to 2,000MW within the next five years and reach 8,000MW by the turn of the century.

—"India should Opt for Nuclear Strategy: Official," Xinhua General Overseas News Service, 22 February 1992; in Lexis-Nexis Academic Universe, 12 January 1992, <http://web.lexis-nexis.com>.

13 February 1992

The Parliamentary Consultative Committee (affiliated with the Ministry of External Affairs) meets to discuss nonproliferation issues and agrees by consensus that India should maintain its status of a nuclear "technology state." Minister of External Affairs Madhavasingh Solanki informs the members of the committee that India cannot accept the NPT with its "unnatural and perpetual" division of the world into nuclear haves and have nots. The Committee also endorses the government's rejection of Pakistan's proposal for a five-nation conference on the creation of the nuclear weapon free zone in South Asia.

—"Parliamentary Panel Discusses Nuclear Option," *Patriot* (New Delhi), 14 February 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 27; Viplav Vidrohi, "South Asia: Pakistan and India in New Nuclear Stand-off," Inter Press Service, 17 February 1992; in Lexis-Nexis Academic Universe, 19 January 1992, <http://web.lexis-nexis.com>.

9 February 1992

Vice-Admiral K.K. Nayar, former Vice-Chief of Naval Staff, says that Pakistan's admission of having a capability to assemble a nuclear device "should force us [India] to have a realistic assessment of security environment in our region." In Nayar's view, Pakistan's testing of a nuclear device will indicate they need it for the sake of prestige. If Pakistan does not test the device, it will indicate it aims at India, he says.

—"Military Experts Say Time for Nuclear Option," *Hindu* (Chennai), 10 February 1992, p. 9; in FBIS Document, jprs-tnd-92-008, 26 March 1992, p. 30.

8 February 1992

Bharatiya Janata Party (BJP) President Murli Manohar Joshi states that India "must waste no time to go nuclear" since Pakistan admits being a nuclear weapon country. According to Joshi, Pakistan has undertaken "various provocative steps," including "nuclear blackmail" not only because of its anti-India attitude but also to show "to its

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terrorist clients in Kashmir that it is willing to do something more for them than fight India to the last Kashmiri."

—"BJP President Urges Delhi 'To Go Nuclear'," *Indian Express* (Mumbai), 9 February 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 27.

8 February 1992

India's Minister of External Affairs Madhavsingh Solanki publicly states that "nuclear bomb... is a part of defense preparedness and we have the defense preparedness."

—"Solanki Meets Press on Approach to Pakistan," *Hindu* (Chennai), 9 February 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 26.

8 February 1992

Pakistan's Foreign Secretary Shahryar Khan tells editors at the *Washington Post* that Pakistan has the knowledge and components to assemble at least one nuclear device.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 326.

6 February 1992

A spokesperson from the Indian Ministry of External Affairs says that India has never imported heavy water from Norway or any other country with the exception of the former Soviet Union. When the Soviet Union supplied the heavy water for the Rajasthan Atomic Power Plant, the International Atomic Energy Agency (IAEA) was aware it. The spokesperson adds that India's position on Norway's allegations will be conveyed to the ambassador of Norway in India shortly. Norwegian officials say it will be hard to compel India to return the 12.5 tons of heavy water they claim it has received via Romania in 1986 in the absence of a formal agreement between India and Norway. Norway says the fact-finding trip to Bucharest in late January confirmed that the heavy water produced by Norsk Hydro AS and supplied to Romania for the Candu pressurized heavy water reactors under construction in Cernavoda was re-exported to the Department of Atomic Energy (DAE) in Mumbai on 20 March 1986.

—"India Denies Diversion of Heavy Water," *Times of India* (Mumbai), 9 February 1992, p. 3; "Denial Reported," *Telegraph* (Calcutta), 7 February 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 26; "New Delhi 'Not Compelled' to Return Heavy Water to Norway," *Nuclear Fuel*, 17 February 1992, pp. 9-10.

4 February 1992

A senior public prosecutor Anstein Gjengedal in Oslo says Norway has fresh evidence that India has illegally received 12.5 tons of heavy water that was originally destined for Romania in 1986. According to Gjengedal, the heavy water was reshipped to the Directorate of Purchase and Storage in Mumbai. Norwegian Foreign Ministry spokesperson Bjoern Blokhuis says that Norway has informed the Indian government of its findings and has given India "reasonable time to respond." Norway expects a comment from India by 13 February and intends to undertake a "tougher strategy" if the response is not forthcoming.

—Karen Fossli, "Rules Broken by India, Says Oslo," *Financial Times*, 5 February, 1992; "Report from Oslo," *Times of India* (Mumbai), 5 February 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 25.

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3 February 1992

Inaugurating an international conference on "Synchrotron Radiation Sources" at the Center for Advanced Technology, AEC Chairman P.K. Iyengar says India's confidence in the nuclear energy development has increased with the development of a 100MW research reactor at BARC. He emphasizes the importance of exchange of information among developing countries on research and development activities. The objective of the conference, the second in a series, is to provide a forum for exchange of information. Scientists from the United States, the United Kingdom, Japan, China, Germany, France, Italy, Switzerland, Denmark, Sweden, Korea, Syria, Malaysia, Bangladesh, Pakistan, Sri Lanka, and Indonesia are participating in this conference.

—"Global Link in Nuclear Energy Studies Urged," *Times of India* (Mumbai), 5 February 1992, p. 11; in FBIS Document JPRS-TND-92-008, 26 March 1992, pp. 30-31.

February 1992

India's Nuclear Power Corporation (NPC) announces that the investment in India's nuclear power program will be half the originally planned 140 billion. The NPC hopes that the six 220MW units currently under construction (two units at Kaiga, two at Kakrapar, and two at Rajasthan) will be completed by the turn of the century.

—"Nuclear Budget Cut," *Nuclear Engineering International*, March 1992, p. 7.

January 1992

Central Intelligence Agency (CIA) Director Robert Gates testifies before Congress that although the United States does not believe that India and Pakistan maintain assembled or deployed nuclear weapons, such weapons could be assembled at short notice.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 326.

31 January 1992

President Bush and Prime Minister Narasimha Rao meet at the UN Security Council Summit at New York. Bush urges Rao to reconsider India's rejection of the proposed five-party regional conference on nonproliferation. Rao instead proposes bilateral talks with the United States on nuclear proliferation issues.

—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 326.

28 January 1992

Minister of External Affairs Madhavsingh Solanki says India's nuclear program is "totally dedicated to the peaceful uses of atomic energy."

—"Suggestion' on Technology Transfer Refuted," *Patriot* (New Delhi), 29 January 1992, p. 1; in FBIS Document JPRS-TND-92-008, 26 March 1992, p. 31.

20-21 January 1992

Minister of External Affairs Madhavsingh Solanki visits Japan. Solanki explains India's position on the NPT. He denies reports that India abstains from the NPT because it has a secret nuclear weapons program. He cites Pakistan and China as the major obstacles to India's signing the NPT.

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—"India Foreign Minister Says Nuke Treaty Discriminates," United Press International, 21 January 1992; in Lexis-Nexis Academic Universe, 12 January 1992, <http://web.lexis-nexis.com>.

20 January 1992

A spokesperson for the Nuclear Power Corporation (NPC) says that India has abandoned the idea of building two Russian-supplied VVER reactors in Koodankulam (Tamil Nadu). According to the spokesperson, there is no information from the new Russian government on the continuation of the project. He says, however, that the NPC has disbanded the team working on the VVER project while hoping to get approval for the construction of two 500MW pressurized heavy water reactors at the site. He adds that few costs have yet been incurred on the project since most of investment was made in the site preparation and foundation studies so far. The detailed project report costing one billion rupees has not been prepared yet. The estimated cost of the VVER project was 64 billion rupees, of which 46 billion was to be financed by the former Soviet Union on a direct rupee/rouble exchange rate. —"NPC Conforms No VVERs for Koodankulam," *Nuclear Engineering International*, March 1992, p. 7.

15 January 1992

Prime Minister Narasimha Rao says India will seek the World Bank loans to finance its nuclear power program. Rao assures Indian lawmakers that India will not be "browbeaten" as far as the [research] reactor sale to Iran is concerned. Atomic Energy Commission (AEC) Chairman P.K. Iyengar says Indian reserves of uranium are sufficient to meet the nuclear fuel needs of the first stage of India's planned three-stage nuclear power generation program. He adds that plutonium extracted from the spent fuel and thorium reserves will be sufficient for the second and third stages of the nuclear power program.

—"India to Seek World Bank Aid to Continue Nuclear Building," *Nucleonics Week*, 30 January 1992, pp. 16-17.

11 January 1992

Addressing a press conference in New Delhi, US Senator Larry Pressler says there is no need to extend the Pressler amendment to India. He remarks that India's nuclear concerns are well taken. Pressler suggests a US-sponsored summit between India and Pakistan to resolve the nuclear issue in the region.

—"India, Pakistan Summit to Resolve Nuclear Issue Suggested by US Senator," Xinhua General Overseas News Service, 11 January 1992; in Lexis-Nexis Academic Universe, 12 January 1992, <http://web.lexis-nexis.com>.

10 January 1992

US Senator Larry Pressler meets India's Prime Minister Narasimha Rao and other high-ranking government officials to discuss nuclear nonproliferation. During the meetings, Indian officials say there is no need for the United States to extend Pressler amendment to India since its nuclear program is exclusively for peaceful purposes. India reiterates it will not sign the NPT due to its discriminatory character.

—"US Senator Holds Nuclear Talks with Indian Leaders," Agence France Presse, 10 January 1991; in Lexis-Nexis Academic Universe, 13 January 1991, <http://web.lexis-nexis.com>.

1 January 1992

India and Pakistan exchange the lists on nuclear installations under the *Agreement on Prohibition of Attack against Nuclear Facilities*. India allegedly does not include a new gas centrifuge uranium enrichment facility located near

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Mysore. However, Indian defense expert K. Subrahmanyam explains that India did provide coordinates for the plant's location at the side of the Atomic Energy Commission's (AEC) Rare Earths factory.

—"India and Pakistan Exchange Nuclear Data Under '91 Pact," *Los Angeles Times*, 2 January 1992, p. A12; George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, & London: University of California Press, 1999), p. 325.

1992

Subsequent to completion of development efforts, India embarks on program to weaponize its nuclear capabilities.

—"Nuclear Backdrop," *From Surprise to Reckoning: The Kargil Review Committee Report* (New Delhi: Sage Publications, December 15, 1999), p. 205.

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1991

1991

Rich reserves of "relatively high grade" uranium ore are discovered in northeastern state of Meghalaya.

—Simon Rippon, "Asian Subcontinent: Nuclear Programs in Pakistan, India," *Nuclear News*, June 1995, pp. 42-43.

16 December 1991

India announces it will not sign the NPT even if China does. India considers the treaty discriminatory and does not intend to change its stance.

—"India Refuses to Join Non-proliferation Pact," *Washington Times*, 17 December 1991, p. A2.

10-15 December 1991

The prime ministers and foreign ministers of India and China meet for a series of talks on issues of mutual concern: China's arms supplies to Pakistan and Myanmar, and India's relations with Pakistan. Indian officials stress the dangers to regional stability from the continued inputs of missile and nuclear technology to Pakistan. Chinese Foreign Minister Qian Qichen says China is not interested in fueling an arms race in the region and expresses his hope that India will sort out differences with Pakistan in a peaceful manner.

—"N-Supplies: Delhi Conveys Concern," *Hindu* (Chennai), 21 December 1991, p. 9; "Chinese Premier Says Visit to India Defines Common Views," United Press International, 15 December 1991; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

22 November 1991

The spokesperson of India's Ministry of External Affairs says that India has a scrupulous record in nuclear nonproliferation and it is "up to Iran to satisfy the safeguard requirements of the International Atomic Energy Agency (IAEA)" after it receives a 10MW research reactor from India. He says that India does not intend to sell nuclear technology "in a big way," noting that the negotiations with Iran are in the preliminary stage.

—"India, US End Thorny Talks on Nuclear Policy," *Agence France Presse*, 22 November 1991; in Lexis-Nexis Academic Universe, 25 November 1991, <http://web.lexis-nexis.com>.

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21 November 1991

Reuters reports that India has canceled the planned research reactor sale to Iran "after stiff criticism in the United States." A senior official at the Ministry of External Affairs of India says a "decision has been taken at the highest level not to sell the reactor to Iran."

—"India Cancels Sale of Reactor to Iran," *Washington Times*, 21 November 1991, p. 2; "India Withdraws Offer to Iranians of N-Reactor," *Financial Times* (London), 21 November 1991, p. 6.

21-22 November 1991

US Undersecretary of State Reginald Bartholomew visits New Delhi to discuss the planned sale of a research reactor to Iran and other nonproliferation related issues. According to a spokesperson of the Ministry of External Affairs of India, Indian officials explained to Bartholomew that the sales negotiations are at the initial stage between the atomic energy commissions of the two countries and denied that Indian foreign minister Madhav Singh Solanki discussed the issue during his recent visit to Tehran. The spokesperson says Indian sales of research reactors will be subject to International Atomic Energy Agency (IAEA) safeguards and India plans to take into consideration the reservations some developing countries have against this sale. It will also take into account American concerns. During the visit, Bartholomew and Solanki discuss Pakistan's proposal for a South Asian nuclear weapon free zone and Solanki says India has "an open mind" about attending the five-nation (United States, Russia, China, Pakistan, and India) conference proposed by Pakistan even though it is skeptical about regional nonproliferation arrangements. The *Hindu* (Chennai), citing "knowledgeable sources," reports that Bartholomew informally suggested that India join the Nuclear Suppliers Group.

—"India Say Research Reactor Sale to Iran is in Preliminary Stages," *Nucleonics Week*, 28 November 1991, p. 8; David Housego, "India Shifts Stance on N-Weapons Conference," *Financial Times* (London), 25 November 1991, p. 3; K.K. Katyal, "Nuclear Issue: India to Study US Suggestion," *Hindu* (Chennai), 30 November 1991, p. 9; "West Urges India to Join London Club," *Hindu* (Chennai), 2 December 1991, p. 6; in FBIS Document JPRS-TND-92-002, 31 January 1991, p. 18.

20 November 1991

Suresh Kalmadi, a member of the Indian parliament from the ruling Congress (I) party, raises the issue of a research reactor sale to Iran in the Rajya Sabha (upper house of parliament). Kalmadi says the government of India should not under any circumstances succumb to the US pressure to refrain from the sale of the reactor to Iran. He adds that such sales should not be the privilege of industrialized world.

—"Indian MPs Urge Nuclear Reactor Sale to Iran," *Asian Defense Journal*, December 1991, p. 124.

19 November 1991

A Western diplomatic official says the United States will strongly urge India to refrain from selling a research reactor to Iran. US Undersecretary of State Reginald Bartholomew will travel to New Delhi to discuss the planned sale of research reactors to Iran and Syria. Atomic Energy Commission (AEC) Chairman P.K. Iyengar confirms the offer to Iran, comparing it with the one made by Argentina to Peru, Algeria, and Turkey. Iyengar emphasizes that India makes its offers openly unlike the case with China's offer to Algeria in the 1980s. *Nucleonics Week*, citing Indian sources, reports that Indian officials are planning to slow the pace of sales to Iran in response to US pressure.

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—"US to Ask New Delhi to Back Off on Research Reactor Offer to Iran," *Nucleonics Week*, 21 November 1991, p. 2;
"Indian MPs Urge Nuclear Reactor Sale to Iran," *Asian Defense Journal*, December 1991, p. 124.

Mid-November 1991

In an interview with *Hindustan Times* (New Delhi), Atomic Energy Commission (AEC) Chairman P.K. Iyengar confirms the offer of a 10MW research reactor to Iran.

—"US to Ask New Delhi to Back Off on Research Reactor Offer to Iran," *Nucleonics Week*, 21 November 1991, p. 2.

16 November 1991

Indian foreign ministry spokesperson Aftab Seth says the government does not have an immediate response to the statement issued by the US Department of State on the issue of India's planned sale of a 10MW nuclear research reactor to Iran.

—"No Comment on US Demand to Back Away from Nuclear Reactor Sale," Associated Press, 16 November 1991; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

15 November 1991

The United States expresses concern over potential sale of an Indian 10MW nuclear research reactor to Iran due to the possibility that Iran might use the facility to produce fissionable material for nuclear weapons or manufacture its own facility modeled on the Indian reactor in case International Atomic Energy Agency (IAEA) safeguards are attached to the sale. According to the US State Department's spokesperson, the US Assistant Secretary of State Edward Djerejian has raised the issue with the Indian ambassador to the United States, Abid Hussain. India's Deputy Foreign Minister Eduardo Faleiro says he is unaware of the nuclear deal with Iran and the newspaper report is "a deliberate attempt to spread more misgivings about India."

—Steve Coll, "Iran Reported Trying to Buy Indian Reactor," *Washington Post*, 15 November 1991, pp. A33, A39;
"India Withdraws Offer to Iranians of N-Reactor," *Financial Times* (London), 21 November 1991, p. 6; Ajay Singh, "India Reportedly Selling Nuclear Reactor to Iran," Associated Press, 15 November 1991; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

11 November 1991

The *Times of India* (Mumbai) reports on the experiments with nuclear fusion carried out at the Institute of Plasma Research (Ahmedabad). Indian scientists are reportedly using the inertial confinement method. The method requires a deuterium pellet impacted by laser beams. According to Atomic Energy Commission (AEC) Chairman P.K. Iyengar, fusion might be achieved by the middle of the next century. Bhabha Atomic Research Center (BARC) director R. Chidambaram agrees with Iyengar. India is continuing its inertial confinement fusion experiments at the Center for Advanced Technology (Indore).

—"Ahmedabad Nuclear Fusion Methods Described," *Times of India* (Mumbai), 12 November 1991, p. 13.

10 November 1991

Scientific Advisor to the Indian government V.S. Arunachalam tells Indian journalists that he estimates that Pakistan is now capable of producing 10 nuclear weapons. Following his statement, Bharatiya Janata Party Vice President Krishna Lal Sharma urges the Indian government to weaponize India's nuclear capabilities.

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—George Perkovich, "American Nonproliferation Initiatives," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley: University of California Press, 1999), p. 324.

9 November 1991

Mumbai-based *Independent* reports that negotiations between India and Iran for the sale of a 10MW research reactor are underway and an agreement is "almost finalized."

—Ajay Singh, "India Reportedly Selling Nuclear Reactor to Iran," Associated Press, 15 November 1991; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

November 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India will build indigenous pressurized heavy water reactors in case the collapse of the Soviet Union adversely affects existing agreement for two 1,000 VVERs to be constructed in Koodankulam. He also rules out the prospects of obtaining power reactors from France.

—"Indian VVER Substitutes," *Nuclear Engineering International*, December 1991, p. 12.I.

November 1991

Bangladesh approaches India, France, Japan, and the Soviet Union for technology and investment to build a 300MW nuclear power station in Rooppur.

—"Bangladesh Seeks Bids," *Nuclear Engineering International*, 1 December 1991, p. 13.

31 October 1991

During the fifth round of foreign secretary-level talks, India and Pakistan agree to notify each other about the location of their nuclear installations and facilities before 1 January 1992. According to the spokesperson for Pakistan's foreign affairs office, India and Pakistan have also discussed the possibility to "cap and reverse" their nuclear programs. In an interview with the *News* (Islamabad), Indian Foreign Secretary Muchkund Dubey says China's decision to adhere to the NPT will not influence India's stance on the treaty. He says the estimates that India possesses 40 to 60 nuclear weapons are based on the amount of plutonium India has. Dubey adds that India does not deny it is nuclear capable, however, it does not mean it has nuclear weapons.

—"India, Pakistan Say They'll Give Nuclear Facility Locations in 1991," *Nucleonics Week*, 7 November 1991, p. 10.

24 October 1991

The second 220MW Narora Atomic Power Station (NAPS) unit goes critical. The unit is expected to begin the production of electric power in a few months. The unit is commissioned four days after a 6.1 earthquake struck India within 200km from Narora. At the inauguration ceremony, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says the plant can withstand an earthquake of 6.7 on Richter scale with the epicenter within 12km. According to Iyengar, the plant has many safety features, including double containment and separate systems for heavy water and light water. Iyengar adds that India will not experience Chernobyl-type accidents. India's nominal nuclear power capacity has now risen to 1,780MW, while actual capacity is under 1,000MW because all the plants are working below their full capacity levels.

—Government of India, "Department of Atomic Energy Annual Report 1991-1992," p. 1.1; "Second Narora Unit Goes Critical as Quake Leaves Plant Unscathed," *Nucleonics Week*, 31 October 1991, p. 5.

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9 October 1991

Indian Ambassador to Libya Abid Hussain says India declined to export nuclear technology to Libya when it received a request more than a decade ago. Hussain remarks that India has an impeccable nonproliferation record and has "neither imported or exported nuclear technology to anybody."

—Gene Kramer, "India Refused Technology to Libya, Envoy Says," Associated Press, 9 October 1991; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

6 October 1991

India's Minister of External Affairs Madhav Singh Solanki says that the US Secretary of State James Baker advised that India should sign the NPT because France and China have expressed their willingness to adhere to the treaty as well. Solanki says unless there is equality among the treaty signatories, there is no point to press India to adhere to the NPT.

—"Solanki: No US Pressure to Sign Nuclear Pact," Delhi All India Radio, 6 October 1991; in FBIS Document JPRS-TND-91-017, 7 November 1991, pp. 21-22.

1-3 October 1991

Iranian deputy Foreign Minister Alaeddin Borujerdi visits India to finalize an agreement on India's supply of 10MW research reactor to Iran, as well as to discuss defense cooperation with India.

—"India Offers Tehran Nuclear Research Reactor," *Irna* (Tehran), 2 October 1991, in FBIS Document JPRS-TND-91-016, 29 October 1991, p. 35.

Late September 1991

Retired Indian chief of army staff General K. Sundarji says the "lack of nuclear doctrine [in India and Pakistan] is a dangerous thing. If you keep it under wraps you don't know what will develop." He adds that in the event of military conflict with Pakistan, the Indian military establishment has to keep in mind not to cross a certain threshold, but they cannot know what this threshold is for Pakistan. Sundarji argues it is necessary to establish formal doctrines and make them public to be able to control the chances of miscalculation. Lieutenant General M. Thomas, a retired commandant of India's main military academy, says the prospects of miscalculation in the current ambiguous climate between India and Pakistan are the biggest concern for the military high command in India.

—"South Asia Retains Its Nuclear Option," *Washington Post*, 30 September 1991, pp. A1, A15.

26 September 1991

At the 11th Plenary Meeting of the 46th Session of the United Nations General Assembly (UNGA), Indian representative Madhav Singh Solanki praises the conclusion of the Strategic Arms Reduction Treaty (START) as "an outstanding achievement in the field of nuclear disarmament." He says, however, that this is a limited measure that affects only quantity, not quality, of the nuclear weapons possessed by the two superpowers. According to Solanki, "the reductions should be deeper, quicker, and should involve all the nuclear weapon states. The treaty should not lead to qualitative upgrading of the remaining arsenals, nor should the warheads released be reused in other systems." Solanki says nuclear weapons and the theory of nuclear deterrence are irrelevant in the post-Cold War world. He argues that it is time to start working on a new agreement "to give legal effect to a binding

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commitment by the nuclear weapon states to eliminate nuclear weapons within a time-bound framework, and by all non-nuclear-weapon states not to cross the nuclear threshold." He says the implementation of the Action Plan [suggested by Rajiv Gandhi in 1988] can help to eliminate the division of the world on nuclear "haves" and "have nots" enshrined by the NPT. According to Solanki, India has scrupulously followed nonproliferation policy and has not assisted any country in building nuclear weapons even though it is not a signatory of the NPT.

—Madhav Singh Solanki, Speech at 11th Plenary Meeting of the 46th Session of UNGA, 26 September 1991, Ministry of External Affairs, Government of India, www.meadev.nic.in.

18 September 1991

The chairman of Bharat Heavy Electricals Ltd (BHEL) P.S. Gupta announces that BHEL, for the first time, has manufactured 500MW nuclear power machines for the Tarapur atomic power plant. According to Gupta, BHEL has emerged as one of the few companies in the world possessing frontline technologies in power and associated fields.

—"First Indigenous 500MW Nuclear Power Machines," *Times of India* (Mumbai), 19 September 1991, p. 14; in FBIS Document JPRS-TND-91-016, 29 October 1991, p. 34.

17 September 1991

Janata Dal leader George Fernandes says that poor safety standards at India's nuclear installations threaten "disaster." He remarks that the latest threat comes from the Rajasthan Atomic Power Station (RAPS), which is releasing irradiated water into the local river. According to Fernandes, villages in the area are reporting a sharp increase in deformities in newborn babies. Fernandes accuses the government of having a vested interest in the nuclear industry and withholding the information.

—Pratap Chakravarty, "Indian Atomic Plants Dumping Radioactive Waste: Opposition Leader," Agence France Presse, 17 September 1991; in Lexis-Nexis Academic Universe, 17 September 1991, <http://web.lexis-nexis.com>.

17 September 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar announces at the International Atomic Energy Agency (IAEA) conference in Vienna that two more 220MW pressurized heavy water (PHW) reactor units (one at Narora, one at Kakrapar) will be commissioned in the next few months. According to Iyengar, the Indian government has approved the construction of two 500MW pressurized heavy water reactors at Tarapur.

—"More Heavy Water Reactors to be Commissioned," *Times of India* (Mumbai), 18 September 1991, p. 8; in FBIS Document JPRS-TND-91-016, 29 September 1991, p. 35.

8 September 1991

India's Nuclear Fuel Corporation (NFC) Chief Executive Balarama Moorthy says NFC plans to set up four new plants during the eighth plan period at an estimated cost of 6.5 billion rupees. The plants include a Uranium oxide fuel plant that would produce 660 tons of uranium oxide pellets per year; a uranium fuel assembly plant; a zircalloy fabrication plant; and a zirconium sponge plant to produce 300 tons of zirconium per year. Moorthy adds the four projects have already been cleared by the Planning Commission and are awaiting the cabinet's approval. He says these four units will help to achieve a capacity of 6050MW of nuclear power per year by the turn of the century.

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—"Four Nuclear Power Station Supply Plants," *Patriot* (New Delhi), 9 September 1991, p. 6; in FBIS Document JPRS-TND-91-016, 29 September 1991, p. 34.

September 1991

The joint committee of the US Senate and the House of Representatives decides not to extend the Pressler Amendment to India.

—"US Shows Balanced Perspective in Amendment," *Deccan Herald* (Bangalore), 20 September 1991, p. 8; in FBIS Document JPRS-TND-91-017, 7 November 1991, pp. 19-20.

September 1991

The Bhabha Atomic Research Center (BARC) is reportedly working on a plan to introduce thorium along with uranium-plutonium mixed oxide into one of the operating pressurized heavy water reactors. Under the plan, 600kg of thorium will be loaded into the reactor core in the initial stage of reactor operation. The Atomic Energy Regulatory Board (AERB) newsletter says this will be a regular feature in future reactors.

—"Plans to Use Thorium in Reactors Noted," *Patriot* (New Delhi), 15 September 1991, p. 10; in FBIS Document JPRS-TND-91-017, 7 November 1991, p. 22.

Late August 1991

The Indian government allocates 900 million rupees (approximately \$35 million) for the imports of heavy water through March 1992. Analysts believe that the sum will be enough to procure about 90 metric tons of heavy water. The allocation is a part of the budget request submitted by the Department of Atomic Energy (DAE).

—Neel Patri "Indian Government Sets Aside Money to Import 90 MT of Heavy Water," *Nuclear Fuel*, 2 September 1991, p. 11.

Late August 1991

The Department of Atomic Energy (DAE) plans to invest about 7 billion rupees (approximately \$270 million) in nuclear facilities over the next decade. Yet, it intends to scale down the target of nuclear power generation by the year 2000 to 6,050MW. DAE confirms switching to mixed uranium-plutonium fuel instead of mixed carbide fuel since the latter caused technical problems. According to DAE's annual report, the Nuclear Fuel Complex (Hyderabad) plans to provide fuel for the four of the planned pressurized heavy water reactor projects (Uranium Oxide Fuel Plant-1, Uranium Fuel Assembly Plant-1 and a 150 MT/year Zircaloy Fabrication Plant - all in Hyderabad, and 300 MT/year Zirconium Sponge Plant to be commissioned by 1994 at Palayakayal [Tamil Nadu]). The report states that the government has authorized 1.54 billion rupees for these four projects. The Atomic Energy Regulatory Board (AERB) has licensed the projects and the Pollution Control Board provided the clearance for a uranium oxide fuel plant. DAE has also received a preliminary approval for procurement of sintering furnaces and hydraulic presses.

—Neel Patri "India's DAE Plans New Investment to increase Nuclear Fuel Production," *Nuclear Fuel*, 2 September 1991, pp. 10-11; "India's Nuclear Power Generation Target Scaled Down," Xinhua General Overseas News Service, 22 August 1991; in Lexis-Nexis Academic Universe, 23 August 1991, <http://web.lexis-nexis.com>.

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28 August 1991

US Deputy Secretary of State L. Eagleburger tells the Chief of the Indian Army Staff General S.F. Rodrigues during the latter's visit to Washington that it is time for India to reconsider its position on the NPT now when both France and China have agreed to sign it.

—"US Urges India to Sign Nonproliferation Pact," *Times of India* (Mumbai), 29 August 1991, p. 11; in FBIS Document JPRS-TND-91015, 27 September 1991, p. 14.

26 August 1991

Citing financial reasons, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India will reduce its target nuclear power capacity for the year 2000 from 10,000 to 9,000MW. The AEC has received 160 billion rupees of budget appropriations instead of the requested 320 billion rupees. Out of expected 9,000MW, 7,000MW will be produced by indigenously developed pressurized heavy water reactors (PHWR) and 2,000MW will come from light water reactors to be commissioned with the help from the USSR. At a seminar on small and medium-sized nuclear reactors, Iyengar states that installed nuclear capacity in India constitutes 1,465MW and comes from seven units — two at Tarapur Rawatbhata, and Kalpakkam, and a 235MW plant at Narora. The seven projects to be brought online within four years include: a second 235MW unit at Narora, two 235MW units at Kakrapar (Gujarat), one 235MW unit at Rajasthan and one 235MW unit at Kaiga (Karnataka). Iyengar's plan also includes four 500MW PHWR units at Rawatbhata (Rajasthan) and two at Tarapur — all six are still in the engineering design stage. However, the Department of Atomic Energy (DAE) states that the costs for the construction of the second unit of Narora has escalated from 160 million rupees to over 400 million rupees and instead of beginning its operation in March 1991, the unit is expected to come online in August. According to Iyengar, Egypt and Syria are seriously considering India's offer to supply 5MW research reactors. Iyengar says India has the capabilities for designing, construction, commissioning, and operating 5MW research reactors.

—"Costs Will Keep India from Making Year 2000 Nuclear Building Target," *Nucleonics Week*, 29 August 1991, p. 4; "Official Confirms Offer of Nuclear Reactors Sale," Delhi All India Radio Network, 26 August 1991; in FBIS Document JPRS-TND-91-014, 12 September 1991, p. 19.

18 August 1991

In a joint statement in New Delhi, the Bharatiya Janata Party (BJP) Vice Presidents Sundar Singh Bhandari, Sikandar Bakht, and K.P. Malkani express concern over Pakistan's acquisition of nuclear weapons.

—"BJP Decries Pakistan's Nuclear Weapons," Delhi All India Radio Network, 18 August 1991; in FBIS Document JPRS-TND-91-014, 12 September 1991, p. 19.

13 August 1991

A spokesperson for India's Ministry of External Affairs says India's stance on the NPT has not changed and there is no pressure for India to sign the treaty or to link the signature of the treaty with any other issue.

—"Rao: No Change in Nonproliferation Stand," Delhi All India Radio Network, 13 August 1991; in FBIS Document JPRS-TND-91-013, 21 August 1991, pp. 12-13.

12 August 1991

Former Director of the New Delhi-based Institute for Defense Studies and Analyses, K. Subrahmanyam, says it will

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be possible for India to sign the NPT as a nuclear weapon power if India is "patient enough" and waits until Israel and Pakistan are "accommodated" into the NPT. Subrahmanyam quotes US Senator John Glenn, who said in early August that one cannot expect India to sign the NPT unless China stops its transfers of nuclear technology to Pakistan.

—"PRC Decision on Nonproliferation Pact Welcomed," *Patriot* (New Delhi), 12 August 1991, p. 5; in FBIS Document JPRS-TND-91-015, 27 September 1991, p. 14.

10 August 1991

The Indian government delays construction of the uranium oxide plant in Turandih, Bihar.

—"Center Hesitant Over Uranium Fuel Complex," *Times of India* (Mumbai), 10 August 1991, p. 6; in FBIS Document JPRS-TND-91-015, 27 September 1991, p. 17.

2 August 1991

The annual report of the Ministry of Defense of India expresses concern over proliferation of nuclear weapons and ballistic missiles in India's neighborhood. It states the Indian government is closely watching developments in the region to take necessary measures to safeguard India's security.

—"Concern Expressed over Nuclear Proliferation," Delhi All India Radio Network, 2 August 1991; in FBIS Document JPRS-TND-91-013, 21 August 1991, p. 12.

August 1991

A leading scientist associated with the Narora atomic power project says that the earliest date for the second unit of Narora to go critical is December 1991. The DAE earlier reported that the unit would go critical as early as August 1991.

—"Developments in Nuclear Power, Fuel Reported," *Patriot* (New Delhi), 31 August 1991, p. 8; in FBIS Document JPRS-TND-91-016, 29 October 1991, p. 33.

August 1991

The Atomic Energy Commission (AEC) says it does not expect that the rupee devaluation will have a significant impact on its technology imports since imports constitute only 10-15 percent of its budget. AEC expects Indian exports to become more competitive as a result of devaluation. India's offer to export research reactors and reprocessing services — both subject to International Atomic Energy Agency (IAEA) safeguards — has "attracted considerable interest from Middle East and Africa." The reactors offered include "high shut down margins, low radiation fields outside the reactor and assured core submergence under emergency conditions." The reactors use one millimeter flat plates of uranium silicate in an aluminum matrix with less than 20 percent uranium-235.

—"Rupee Devaluation Will Not Hit Nuclear Projects," *Nuclear Engineering International*, September 1991, p. 8.

August 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India has ordered the test components for the Prototype Fast Breeder Reactor (PFBR). Items currently ordered at Bharat Heavy Electricals Ltd. and Larsen and Turbo Ltd. include intermediate heat exchangers and steam generators. The atomic energy establishment is making fast breeder research a top priority for India. Development of fast-breeder technology will provide India

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with an opportunity to utilize its vast thorium resources. Thorium will be used as a blanket layer to breed Uranium-233.

—"Moving Forward on Indian PFBR," *Nuclear Engineering International*, September 1991, p. 8.

August 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says that hardware for the two VVER-1,000 units to be built in Koodankulam with Soviet help will come from the USSR, while electrical and control systems, as well as software, will be largely developed in India. According to Iyengar, India has budgeted \$250 million to purchase Western "equipment and expertise" to be incorporated into these reactors.

—"Western Controls for Indian VVER," *Nuclear Engineering International*, September 1991, p. 8.

17 July 1991

At a high-level meeting at Thiruvananthapuram, Atomic Energy Commission (AEC) Chairman P.K. Iyengar provides safety assurances to the government of Kerala regarding the construction of the proposed 1,000MW nuclear power plant. The state government accepts Peringom (district Kasargod in Kerala) as the site for the new plant. According to Iyengar, the plant will be built indigenously within a seven-year period and will cost around 25 billion rupees. Iyengar says the final decision on the plant construction should be made by the central government.

—"Indigenous Reactors for Planned Power Plant," *Indian Express* (Chennai), 19 July 1991, p. 13; in FBIS Document JPRS-TND-91-015, 27 September 1991, p. 16.

July 1991

The Press Trust of India (PTI) reports that uranium oxide and heavy water were used in the Chemical Engineering Department of the regional engineering college in Durgapur (West Bengal) without proper authorization. Both chemicals are considered "strategic" and are not available in the open market or for research purposes at the other engineering institutes. Experts from the Bhabha Atomic Research Center (BARC) are scheduled to visit Durgapur to check radiation levels.

—"Unauthorized Use of Heavy Water, Uranium Oxide," *Statesman* (Calcutta), 20 July 1991, p. 7; in FBIS Document JPRS-TND-91-015, 27 September 1991, p. 18.

July 1991

India's Prime Minister Narasimha Rao says India will not sign the NPT and any "doubts on this score are unwarranted." Rao's statement comes in response to reports in the Indian press that Japan and the International Monetary Fund (IMF) are pressing India to sign the NPT in return for loans needed to service India's balance of payments account. Pakistani Prime Minister Nawaz Sharif calls Rao to discuss prospects for a five-nation meeting to create a nuclear-weapon-free zone in South Asia. This issue is discussed in mid-June during a closed door seminar sponsored by the Institute of Defense Studies and Analyses (IDSA), New Delhi, and attended by 40 high-level experts including Indian Foreign Secretary Muchkund Dubey, and a former Minister of External Affairs I.K. Gujral. According to news reports, the experts concluded that India could use the Pakistan-proposed forum to bind China into regional nonproliferation commitments. In a newspaper interview in early July, Rao states, however, that India cannot accept a regional arrangement in the absence of global disarmament when "no one knows what the other country is going to do in spite of the agreement." According to Pakistan's Foreign Secretary Shahryar

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Khan, the issue will be discussed during the fifth round of Indo-Pakistani secretary-level talks that are scheduled to take place in Islamabad in early September.

—"New Indian Prime Minister Says Anti-NPT Stance Will Remain Firm," *Nucleonics Week*, 18 July 1991, p. 17; "Rao Cool to Nuclear Talks with Pakistan," *Hindu* (Chennai), 14 July 1991, p. 1; in FBIS Document JPRS-TND-91-013, 21 August 1991, pp. 10-11.

Mid-June-September 1991

Equipment problems prevent the Baroda Heavy Water Plant from maintaining sustained operations. According to the Department of Atomic Energy (DAE), three internal shells located in a multistage exchange tower of the Plant were damaged due to denting. The Bhabha Atomic Research Center (BARC) later determined that this denting was due to freezing water that had been poured into the annular gap between the stage shells and the tower. This reportedly occurred while the tower was at a low temperature.

—Government of India, "Department of Atomic Energy Annual Report 1991-1992," pp. 1.7, 2.22.

21 June 1991

P.V. Narasimha Rao is sworn in as India's new prime minister. Rao is briefed about the status of India's nuclear weapons program and is shocked to discover that India is far from ready to deploy deliverable nuclear weapons. Indian intelligence suggest that Pakistan is close to acquiring a deliverable nuclear capability.

—Raj Chengappa, "Caught in The Crosshairs," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers Limited, 2000), p. 370.

14 June 1991

The Bharatiya Janata Party (BJP) Vice-President K.R. Malkani regrets the US decision to extend the Pressler amendment to India. He states that his party rejects "any decision by any foreign party to place restrictions on India's sovereign right to pursue its national goals as defined by Indians themselves. Our people would not falter in their determination to safeguard the sovereignty, unity, and territorial integrity of India by any and all means."

—"India's Major Parties Speak Out against US Congress Nuclear Decision," Xinhua General News Service, 16 June 1991; in Lexis-Nexis Academic Universe, 17 June 1991, <http://web.lexis-nexis.com>.

14 June 1991

Responding to the US decision to extend the Pressler amendment to India, the spokesperson for the Ministry of External Affairs of India says that Washington's attempt to equate India with Pakistan is "misplaced." He remarks that India has consistently been following a policy of nuclear restraint while Pakistan is pursuing clandestine nuclear program in violation of US laws.

—"India Objects to US Decision on Nuclear Issue," Xinhua General News Service, 14 June 1991; in Lexis-Nexis Academic Universe, 15 June 1991, <http://web.lexis-nexis.com>; "US Congress Move on Indian Nuclear Programme Sparks Resentment," Agence France Presse, 14 June 1991; in Lexis-Nexis Academic Universe, 15 June 1991, <http://web.lexis-nexis.com>.

13 June 1991

The US House of Representatives approves, 242-141, an amendment to the Foreign Assistance Act that will extend

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the Pressler amendment to India. This will require the US President to certify each year that India is not developing nuclear weapons before continuing the aid flows. To become law, this amendment still has to be approved by Senate and signed by President Bush. Robert Lagomarsino, a Republican from California, who is one of the sponsors of the new amendment, says the White House is likely to veto the bill "on the grounds that the small amount of money involved would not be worth straining relations with India."

—"House Wants Tougher India Nonproliferation Stance," *Nuclear Engineering International*, August 1991, p. 11.

6-7 June 1991

Pakistani Prime Minister Nawaz Sharif proposes that United States, Soviet Union, and China mediate nuclear disarmament talks between Pakistan and India. Pakistan argues its proposal is modeled on the regional pacts in Latin America and South Pacific. However, India rejects the proposal. Aftab Seth, the spokesperson for India's Ministry of External Affairs says regional security arrangements are "illusory" since nuclear weapons have global reach. Seth says India views Pakistani proposal as "a propaganda exercise and a tactic by Pakistan for diverting international pressure to give up its nuclear weapons program." India's Foreign Secretary Muchkund Dubey says India must consider China and Pakistan when managing its nuclear weapons program. Dubey acknowledges that India and Pakistan cannot adopt nuclear deterrence doctrine based on the principle of mutual assured destruction since both countries possess limited nuclear arsenals and delivery systems.

—Steve Coll "India Rejects Pakistani Bid for Talks on Nuclear Ban," *Washington Post*, 8 June 1991, p. A17; "India Rejects Pakistan's Call for Atom Talks," *New York Times*, 8 June 1991, p. 4.

26 May 1991

Speaking to the journalists at a program organized by Press Institute of Pakistan in Lahore, former Chairman of the Pakistan Atomic Energy Commission (PAEC) Munir Ahmed Khan says that according to PAEC sources India possesses 1,300kg of plutonium of which 400kg is weapons-grade. This is enough to develop 50 to 70 nuclear warheads, he says.

—"Khan Says India Has Plutonium to Make 50-70 Atom Bombs Anytime," *Nucleonics Week*, 20 June 1991, p. 18.

15 May 1991

The Atomic Energy Commission (AEC) offers to process foreign spent fuel on a commercial basis under International Atomic Energy Agency (IAEA) safeguards. Under the proposal, India will require the nuclear waste from reprocessing be shipped back to the country of origin. AEC Chairman P.K. Iyengar says there should be no concern that the countries reprocessing their fuel in India will acquire plutonium since the reprocessing will be carried out under IAEA safeguards. He says he has informed IAEA that India wants to develop manpower-intensive operations such as reprocessing that can be done more cheaply in developing countries. According to Iyengar, AEC also plans to export research reactors, consultancy services, and related nuclear technologies that are not proliferation sensitive. No export orders have been confirmed so far but Iyengar says deals with Syria, Egypt and several other countries are being negotiated. According to Iyengar, IAEA is also expected to purchase nuclear equipment and products from India to be used in IAEA's technical assistance program.

—"India's AEC Offers to Reprocess, Under Safeguards, Foreign Spent Fuel," *Nuclear Fuel*, 27 May 1991, pp. 8-9; "Offer to Reprocess Spent Nuclear Fuel Reported," Hong Kong AFP, 15 May 1991; in FBIS Document JPRS-TND-91-008, 31 May 1991, p. 22.

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7 May 1991

Paul Chaffey, a member of Storting (Norwegian Parliament) says Norway might freeze development aid to India if the Indian government does not provide an explanation for what happened to the 12.5 tons of Norwegian heavy water that was illegally reshipped to Mumbai, India, from Romania in 1986, as well as to 15 tons of heavy water reshipped by a West German businessman to India in 1983.

—"India, Romania Heavy Water Investigation Seen," *Aftenposten* (Oslo), 7 May 1991, p. 16; in FBIS Document JPRS-TND-91-009, 24 June 1991, p. 38.

30 April 1991

The Bharatiya Janata Party's (BJP) election manifesto proposes to arm India's armed forces with nuclear weapons.

—"BJP Manifesto Promises Nuclear 'Teeth' for Defense," BBC Summary of World Broadcasts, 2 May 1991; in Lexis-Nexis Academic Universe, 7 April 1991, <http://web.lexis-nexis.com>.

16-23 April 1991

The fast breeder test reactor (FBTR) at Kalpakkam begins operation on 16 April at one megawatt of thermal power. It is shut down within four hours due to "discrepancies in neutronic instrumentation." It is restarted on 18 April and operates at 800KW of thermal power. On 23 April it is raised to one megawatt of thermal power again. According to reactor superintendent S.P. Bhoje, the reactor will operate at one megawatt of thermal power for two weeks. This period will be used to check the performance of the neutronic instrumentation at a significant power, measure the power coefficient of radioactivity, carry out thermal balance tests, check the effectiveness of radiation shielding around the reactor, and measure the core temperature.

—"Fast Breeder Reactor Begins Operation," *Hindu* (Chennai), 24 April 1991, p. 10; in FBIS Document JPRS-TND-91-008, 31 May 1991, p. 22; "Kalpakkam Reactor Begins Operation," *Nuclear Engineering International*, July 1991, p. 8.

Early April 1991

During a visit to Vienna, Atomic Energy Commission (AEC) Chairman P.K. Iyengar talks to *Nucleonics Week* about India's nuclear program. He says India and USSR "have agreed on specifications, some details of the time schedule and on the maximum cost" of the two VVER-1,000 reactors to be built in Koodankulam (Tamil Nadu). According to Iyengar, the maximum installation cost will constitute USD 1,800 per a kilowatt of energy which insures the operations will be economical. Iyengar says construction is to begin in 1992 and the station is expected to become operational by 1999. He says the negotiations with a French-West German consortium are under way but there have been no developments recently. According to India's Nuclear Power Corporation (NPC), nuclear power will have to contribute about 30,000MW of energy by 2020. According to Iyengar, India's uranium reserves — 70,000 tons according to NPC estimates — could support the first stage of India's nuclear program that intends to produce 10,000MW of energy while yielding Plutonium-239 for the program's second stage (which would use fast breeder reactors with thorium blankets producing electricity while converting thorium into Uranium-233 to be used as a fuel in the program's third stage). Moreover, Iyengar says Indian researchers are designing a better nuclear reactor core than the one of the CANDU type in order to utilize India's vast thorium resources (estimated at more than 360,000 tons). He says the decision on whether to build a new reactor type will be taken in three to four years. He adds that several countries, especially Argentina and Brazil are interested in this new reactor design. India has been concentrating on indigenous production of nuclear technology and has reached a point where it is ready to

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export some of its technologies, including research reactors. According to Iyengar, India could start exporting reactors of the type China built in Pakistan. However, India does not intend to export reactors on a large scale, he notes. It will work towards solving the electricity problem in India in the first place. By the end of the decade, says Iyengar, India might be able to fulfill large export orders.

—"India, USSR Agree on Cost, Schedule of VVERs to Be Built," *Nucleonics Week*, 4 April 1991, p. 5.

April 1991

The Atomic Energy Commission (AEC) selects the site at Trikkareppur (Kerala) as the most suitable location for the planned eight 500MW pressurized heavy water reactors. The new station will be built using Indian suppliers. The project will be funded by a 45 billion rupees loan from the Soviet Union and is one of the ten projects covered under the Indo-Soviet nuclear cooperation agreement. According to AEC, the loan carries a 2.5 percent interest and has to be repaid in 14 installments starting in 2001. *Energoexport* of the Soviet Union will provide technical assistance for the project. The station will be built in phases — four reactors per phase — and is expected to be operational within six years.

—"India Chooses New Site," *Nuclear Engineering International*, May 1991, p. 8; "Decision Due at Kerala," *Nuclear Engineering International*, April 1991, p. 10.

10 March 1991

The Department of Atomic Energy (DAE) plans to set up a large zirconium and titanium metal complex at Palayakayal village (near Tuticorin in Tamil Nadu) at an estimated cost of 1.8 billion rupees. The complex will utilize the zirconium sand deposit of the area. The complex is expected to begin operation within three to four years. The Tamil Nadu state government will participate in the project through the Tamil Nadu Industrial Development Corporation (TIDCO) and has already approved TIDCO to invest up to ten percent of the equity of the project.

—"Delhi Plans 'Large' Zirconium, Titanium Complex," *Hindu* (Chennai), 11 March 1991, p. 10; in FBIS Document JPRS-TND-91-006, 23 April 1991, p. 17.

6 March 1991

Speaking in the Indian Parliament, Minister of State Kamal Morarka says that a few countries have explored the possibilities of Indian assistance in the development of nuclear technologies. According to Morarka, the International Atomic Energy Agency (IAEA) also expressed interest in "various nuclear instruments and equipment" developed by India. Furthermore, Morarka says the Indian government has agreed to finance the construction of two 500MW pressurized heavy water reactors at Tarapur. This is one of the several projects planned by the Nuclear Power Corporation for the 1990-1995 five-year plan. Other planned projects include four 235MW units to be built at Kaiga (Karnataka), two 500MW units at Rawabhata (Rajasthan), and two 1,000MW units to be built with the assistance from the USSR at Koodankulam (Tamil Nadu). According to Morarka, the Atomic Energy Regulatory Board (AERB) has already provided safety clearance for the projects at Kaiga and Rawabhata. He says environmental appraisal of the sites continues.

—"Proposal to Sell Equipment Explored," *Times of India* (Mumbai), 7 March 1991, p. 7; in FBIS Document JPRS-TND-91-005, 28 March 1991, p. 14; "Indian Government Backs Financing of Two 500MW Units for Tarapur," *Nucleonics Week*, 7 March 1991, p. 10.

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13 February 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India will soon commence work on the Koodankulam nuclear power project. According to Iyengar, 70 billion rupees have been allocated for the project, which is scheduled for completion by 1998.

—"Work to Begin This Year on Tamil Nadu Nuclear Power Plant," BBC Summary of World Broadcasts, 20 February 1991; in Lexis-Nexis Academic Universe, 12 January 1991, <http://web.lexis-nexis.com>.

12 February 1991

Referring to Rajiv Gandhi's letter to Prime Minister Chandra Shekhar on India's nuclear policy, the Bharatiya Janata Party (BJP) all-India secretary J.P. Mathur says Gandhi could have shifted the stance on the nuclear issue five years ago. He calls Gandhi's current suggestion "jerky and ad hoc." Mathur says five years ago, Gandhi also called for a change in India's nuclear policy but he never moved an inch in that direction. He says Congress-run governments "didn't have the guts and vision to go nuclear." Mathur praises the position taken by former Indian Chief of the Army Staff General K. Sundarji on the nuclear issue and says India should "go in for nuclear weapons by national consensus without wasting more time."

—"BJP Advocates India Going Nuclear," *Times of India* (Mumbai), 13 February 1991, p. 3; in FBIS Document JPRS-TND-91-005, 28 March 1991, p. 14.

11 February 1991

In a letter to Prime Minister Chandra Shekhar, former Prime Minister Rajiv Gandhi states that India would have no choice but to convert its "nuclear weapon capability into nuclear weapon capacity" should the United States use nuclear weapons during the Gulf War. Gandhi says India will be among the worst-hit victims in case nuclear weapons are used in West Asia since "the removal of the taboo [against the use of nuclear weapons] at one blow would destroy mental defenses against the outbreak of nuclear war that have been built up in the human mind... Radiation and other consequences of the use of nuclear weapons in the Gulf theater will, in all likelihood, spread to India." Gandhi also meets the President of India R. Venkataraman to brief him on his party's position regarding India's nuclear policy.

—"Gandhi States Congress-I Nuclear Policy," *Times of India* (Mumbai), 12 February 1991; in FBIS Document JPRS-TND-91-005, 28 March 1991, p. 13.

3 February 1991

Former Indian Chief of the Army Staff General K. Sundarji tells Indian news agency UNI that India should develop a nuclear deterrent against nuclear-capable neighbors. Sundarji argues that India should use nuclear weapons as "a defensive capability."

—"Sundarji Advises Need for Nuclear Weapons," *Patriot* (New Delhi), 4 February 1991; in FBIS Document JPRS-TND-91-005, 28 March 1991, p. 13.

1 February 1991

The Atomic Energy Commission (AEC) announces that it is ready to sell its technology and expertise in the international market. Indian exports will be directed primarily at third world countries. A deal with Iran is currently under negotiation. Algeria, Cuba, Turkey, and some eastern countries are also on the AEC's list of potential buyers.

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The technology under India's export list includes nuclear reactor engineering, installation of nuclear power stations, isotope and radiation technology, radiological safety and protection, electronics, and allied instrumentation. AEC Chairman P.K. Iyengar made the official announcement of India's export intentions at the International Atomic Energy Agency (IAEA) conference in Geneva, September 1990. However, the Indian government formally approved the decision much later, after the AEC submitted assurances it would keep the IAEA informed about the details of transactions.

—"India Aims at Third World in Marketing Its Nuclear Expertise," *Nucleonics Week*, 7 February 1991, p. 17; "India Will Actively Seek to Export Nuclear Technology," *Nuclear News*, March 1991, p. 56.

Early February 1991

At a symposium in Mumbai, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India has developed the entire technology for producing plutonium in reactors and isolating it for utilization as fuel in power reactors. He says Indian scientists have investigated and fabricated all types of nuclear fuel containing plutonium. The scientists believe that using plutonium technology for power generation will help to solve India's energy problems.

—"Scientist Says Plutonium Answer to Energy Crunch," *Patriot* (New Delhi), 12 February 1991, p. 2; in FBIS Document JPRS-TND-91-005, 28 March 1991, p. 15; "Official on Plutonium Oriented Nuclear Research," Delhi Domestic Service, 11 February 1991; in FBIS Document JPRS-TND-91-004, 19 March 1991.

February 1991

Atomic Energy Commission (AEC) Chairman P.K. Iyengar claims that the Bhabha Atomic Research Center (BARC) is in the final stages of designing an atomic reactor "using [a] totally indigenous concept." The new reactor will be named Advanced Heavy Water Reactor. It will retain a lot of the features from the Canadian design and will use a mixture of thorium and U-233 around plutonium "seeds" as fuel. Iyengar says plutonium and thorium will be kept in two distinct zones to minimize plutonium consumption while maximizing power produced by thorium. Light water will be used as a coolant while heavy water will be needed only as a moderator. According to Iyengar, the reactor will be cheaper to operate since the "use of boiling light water coolant will save the capital cost of heavy water inventory by 30 percent and reduce make-up requirements by 90 percent and eliminate the need for extensive leak-tightness in all seals and valves, thereby further saving the cost."

—"India Designing Thorium-Fueled Reactor with Light Water Cooling," *Nucleonics Week*, 28 February 1991, p. 14; "Indian Scientists Design New Reactor," Xinhua General Overseas News Service, 21 February 1991; in Lexis-Nexis Academic Universe, 22 February 1991, <http://web.lexis-nexis.com>; "Indigenous Nuclear Reactor Design in Final Stage," All India Radio, Delhi Home Service, 20 February 1991; BBC Summary of World Broadcasts, 27 February 1991, in Lexis-Nexis Academic Universe, <http://www.lexis-nexis.com>.

February 1991

A team from the Iranian Atomic Energy Organization visits India to place an order for a research reactor. [Note: According to *Independent* (Mumbai), India initially offered to sell a 5MW research reactor. Iran, however, has asked for a 10MW reactor.]

—"India Offers Tehran Nuclear Research Reactor," *Irna* (Tehran), 2 October 1991, in FBIS Document JPRS-TND-91-016, 29 October 1991, p. 35; Steve Coll "Iran Reported Trying to Buy Indian Reactor," *Washington Post*, 15 November 1991, pp. A33, A39.

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27 January 1991

Pakistan deposits the instrument of ratification of the Agreement on Prohibition of Attack against Nuclear Facilities, signed in 1988. India's High Commissioner to Pakistan will deposit India's ratification document when he returns to Islamabad. The agreement will come into force upon completion of the exchange of documents.

—"India, Pakistan Exchange Instruments on Non-Attack Agreement," Xinhua General Overseas News Service, 11 January 1991; in Lexis-Nexis Academic Universe, 28 January 1991, <http://web.lexis-nexis.com>.

11 January 1991

An Indian Ministry of External Affairs spokesperson rejects Pakistan's proposal for a regional nuclear test ban treaty. He says India believes that nuclear issues should be tackled globally.

—"India Rejects Pakistan's Proposal for Regional Nuclear Test Ban," Xinhua General Overseas News Service, 11 January 1991; in Lexis-Nexis Academic Universe, 12 January 1991, <http://web.lexis-nexis.com>.

5 January 1991

India returns the nuclear-powered submarine *Chakra* that was leased from the Soviet Union. India's naval chief at the time, Admiral (ret.) Ramdas suggests the lease was terminated because the Indian Navy (IN) had learned all it could about that type of submarine and the lease was turning out to be very expensive. However, former Indian defense minister K.C. Pant suggests that expenses apart, the lease was ended because a sub-clause in the lease contract forbade the IN to deploy the submarine in military operations. In war, the vessel was enjoined to take shelter in a neutral port.

—"Nuclear Sub Returns to the USSR," *Nuclear Engineering International*, April 1991, p. 6; Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), pp. 654-655.

2 January 1991

India's fast breeder test reactor (FBTR) at Kalpakkam begins operations again. According to Director of the Indira Gandhi Center for Atomic Research (IGCAR), S.R. Paranjpe, the reactor is expected to attain 10MW capacity during March and by June the steam generators will be recommissioned and in use. The reactor is expected to operate at up to 40MW of thermal power and 13MW of electrical power until mid-1992, when it is scheduled for refueling. According to Paranjpe, since the international community denied fast breeder reactor technology to India, the country was "bound to make mistakes." S.R. Paranjpe dismisses reports that the reactor is "crippled" and says he feels confident that all the problems have been solved. [Note: The FBTR ran into problems in 1985 when it began initial operations. The plant had to be shut down in May 1987 when 28 fuel sub-assemblies were damaged during refueling. It was restarted in May 1989, but had to be shut down several months later for replacement of the ageing parts. According to reactor superintendent S.P. Bhoje, during August-September 1990, it operated at the level of 500KW of thermal power.]

—"FBTR Starts Up Again," *Nuclear Engineering International*, February 1991, p. 6; "Kalpakkam Reactor Back in Operation," *Times of India* (Mumbai), 9 January 1991; in FBIS Document JPRS-TND-91-003, 25 February 1991, pp. 30-31; "India's FBR Program Faces New Delays..." *Nuclear Engineering International*, February 1991, p. 4.

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Early 1991

The site preparation for the two Soviet VVER reactors begins at Koodankulam. The units are expected to start operation in 1998 and 2000.

—"Work Starts at Koodankulam," *Nuclear Engineering International*, April 1991, p. 6; "India Expects to Start Work This Year," *Nuclear News*, April 1991, p. 84.

Early 1991

Completion of the Hazira heavy water plant falls behind schedule due to delays in the delivery of parts from local suppliers. The Hazira plant will be the first indigenous plant to use the hydrogen ammonia exchange process and is expected to cost 2.64 billion rupees. The plant will have the capacity to produce 110 tons of heavy water annually. [Note: India already has three heavy water plants in operation: at Baroda, Thal and Tuticorin. These plants collectively produce 150 tons of heavy water annually, instead of the estimated 250 tons. It is estimated that India's five pressurized heavy water reactors require approximately 400 tons of heavy water for annual operations. As a result, India is reliant on imports to make up for the internal deficit in heavy water production.]

—"Indigenous D₂O Plant Commissioned," *Nuclear Engineering International*, February 1991, p. 4.

Early 1991

The Department of Atomic Energy (DAE) decides to abandon the mixed plutonium carbide-uranium carbide fuel used in the fast breeder test reactor (FBTR) at Kalpakkam and stay with the conventional plutonium-uranium oxide, while continuing research on alternative types of fuel.

—"...And Abandons New Fuel Changes," *Nuclear Engineering International*, February 1991, p. 4.

Early 1991

The Atomic Energy Regulatory Board (AERB) announces it will not approve work on the 500MW fast breeder reactor prototype [under request submitted by the Department of Atomic Energy (DAE) in September 1990] to be built in Kalpakkam until the fast breeder test reactor (FBTR) at Kalpakkam [based on French Rapsodie design] attains full power operation. AERB states that several problems remain to be addressed: 1) FBTR water lines need cleaning because of "corrosion, biogrowth and biofouling"; 2) the board must be satisfied with the precautions taken against water leaking into the secondary sodium circuit; 3) neutronic channels must be modified "to eliminate the noise pick-up that is causing spurious trips."

—"India's FBR Program Faces New Delays..." *Nuclear Engineering International*, February 1991, p. 4; "India: FBTR Attains Power," *Nucleonics Week*, 9 May 1991, p. 17.

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1990

1990

Environmentalists and economists protest against the construction of two Russia-supplied VVER-1000 reactors in Koodankulam (Tamil Nadu state). They cite "horrible safety records" of this type of reactors.

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—A.S. Paneersilvan, "Opposition Stalls Nuclear Power Program," Inter Press Service, 30 July 1990; in Lexis-Nexis Academic Universe, 1 August 1992, <http://web.lexis-nexis.com>.

1990

The managing director of the Nuclear Power Corporation (NPC) says that India's nuclear program is expected to produce 10,000MW of energy by the year 2000; a target, which if accomplished, would meet 10 percent of India's electricity requirements. The Indira Gandhi Center for Atomic Research (IGCAR) announces that it will submit a report to the government for building a 500MW prototype fast breeder reactor at Kalpakkam. The proposed reactor will use a mixed plutonium-uranium carbide fuel and liquid sodium as a coolant. The estimated cost of the project is \$580 million. However, the commissioning of the heavy water plant at Manuguru (Andhra Pradesh) is delayed until mid-1990.

—"India," *Nuclear Engineering International*, June 1990, p. 24.

1990

India accelerates efforts to build an air-deliverable nuclear device that can be delivered on board Indian Air Force (IAF) Mirage 2000 multi-role combat aircraft. Coordination between the IAF and the Defense Research and Development Organization (DRDO) is increased. Weaponization work is undertaken at three DRDO labs: Armament Research and Development Establishment (ARDE), Terminal Ballistics Research Laboratory (TBRL), and the Electronics Research and Development Establishment (LRDE). ARDE accelerates work on the container for the bomb, mating mechanisms with aircraft, and fail-safe release mechanisms. TBRL works on efforts to reduce the weight of the bomb by optimizing the size of the conventional explosive lens needed to implode the fissile core. A plant is set up to manufacture lighter HMX-TNT explosives as well as more reliable detonators. LRDE designs high-voltage capacitors for the bomb's triggering mechanisms. The weaponization design team begins examining the following aspects of the weapon design: the optimum shape and weight of the bomb; designing and building a bomb container that can withstand the stress and strains of an aircraft in flight; fail-safe electronic trigger mechanisms with safety locks; special communication systems that will enable aircraft pilots to remain in constant touch with ground controllers so that they can be recalled; trade-offs involved in deploying a single man or alternatively two man crew; psychological training for pilots involved in nuclear operations; and possible storage sites for the weapons to ensure speedy access, deployment, and use.

—Raj Chengappa, "End the Wink and Nudge Approach," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: Harper Collins Publishers India, 2000), pp. 359-360.

31 December 1990

India's former Chief of the Army Staff General K. Sundarji discusses the importance of India and Pakistan adopting "a declared nuclear weapon status" to reduce the chances of miscalculation and send clear signals of deterrence to each other. Sundarji says, "the differences between India and Pakistan, in geography, may cause proportionately more damage to Pakistan. But the damage to India will be in absolute terms. The nuclear reality demands that on neither side can a planner recommend nor any decisionmaker accept any step that would have a high probability of leading to a nuclear exchange." He says both sides should have a clear understanding of what constitutes their "vital interests" a threat to which could lead to nuclear exchange. He says a debate within each country and between both countries can facilitate these issues. Sundarji adds it is essential that India embarks on confidence

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building measures with her smaller neighbors allaying their "Kuwait syndrome" by providing them with "a few short to medium range weapon systems" without conditions.

—General K. Sundarji "Declare Nuclear Status," *India Today*, 31 December 1990, p. 73.

24 December 1990

Former defense minister and a senior Congress party leader, K.C. Pant, publicly emphasizes that India has no option but to possess nuclear weapons to counter the nuclear threat from Pakistan. He says it is important to raise awareness "of the dangers of nuclear asymmetry — when one side has a capability well ahead of the other." Pant argues that an Indian nuclear capability will eliminate the potential for miscalculation or misadventure on Pakistan's part.

Pant says the problem of a potential nuclear threat from Pakistan must be addressed in detail at different levels of the government (both military and civil), as well as the international community. He warns against downplaying the threat from Pakistan.

—"Pant Says Nuclear Weapon Needed," *Patriot* (New Delhi), 25 December 1990; in FBIS Document JPRS-TND-91-003, 25 February 1991, p. 29.

20 December 1990

India and Pakistan agree to ratify the "Agreement on Prohibition of Attack against Nuclear Facilities" signed by the two countries in December 1988. A joint statement indicates that the two sides will ratify the agreement in January 1991.

—"Pakistan, India to Ratify Confidence-Building Accord," Japan Economic Newswire, 20 December 1990; in Lexis-Nexis Academic Universe, 20 December 1990, <http://web.lexis-nexis.com>; "India: Talks with Pakistan Yield Mixed Results," Inter Press Service, 21 December 1990; in Lexis-Nexis Academic Universe, 23 December 1990, <http://web.lexis-nexis.com>; Steve Coll "Ban is Imposed on Attacks Nuclear Installation," Washington Post, 21 December 1990; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

19 December 1990

US President George Bush offers assistance in "normalizing relations between Pakistan and India."

—"Pakistan and India to Implement Accord on Nuclear Plant Attacks," *Nucleonics Week*, 3 January 1990, p. 3.

17 December 1990

Indian Foreign Secretary Muchkund Dubey arrives in Islamabad to discuss Pakistan's proposal for a bilateral or regional agreement on nuclear nonproliferation in South Asia.

—"Indian and Pakistani Officials Renew Nonproliferation Talks," *Nucleonics Week*, 20 December 1990, p. 13.

13 December 1990

US President George Bush approves the sale of Cray supercomputers to Brazil, India, and China. He orders new controls on export licenses for the sensitive, advanced technology equipment. In a written statement, White House press secretary Marlin Fitzwater says, "The president approved several of the license applications, but because of the potential strategic applications of such computers, he also required the imposition of stringent safeguards to ensure that the computers will be used exclusively for peaceful civilian purposes."

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—"President Approves Supercomputer Exports," Associated Press, 13 December 1990; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

11 December 1990

Officials in India's Department of Atomic Energy (DAE) say that India's fast breeder reactor program may be delayed for three to five years due to the problems with India's fast breeder test reactor (FBTR) at Kalpakkam. The Kalpakkam FBTR, commissioned in 1985, was designed to generate 40 million watts of thermal power and 13 million watts of electricity. To date, the reactor has not produced electricity and has been idle most of the time.

—"India's Fast Breeder Reactor Program in Jeopardy," Xinhua General Overseas News Service, 11 December 1990; in Lexis-Nexis Academic Universe, 12 December 1990, <http://web.lexis-nexis.com>; N. Vasuki Rao "More Problems Beset India's Nuclear Program," Journal of Commerce, 19 December 1990; in Lexis-Nexis Academic Universe, 12 December 1990, <http://web.lexis-nexis.com>.

December 1990

India and Egypt sign an agreement on cooperation in the peaceful uses of nuclear energy in several fields, including radiation technology for medicine and industry. The agreement is to come into effect in January 1991 and will be valid for five years, after which it can be renewed. According to the Egyptian nuclear expert, Dr. Raja'I Zaghlul, India will cooperate with Egyptian experts to increase the capacity of the Egyptian research reactor from two to five megawatts.

—"Pact Signed with India on Nuclear Cooperation," Cairo MENA, 10 December 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 21.

December 1990

Foreign Secretaries Muchkund Dubey of India and Shahryar Khan of Pakistan conduct a third round of talks on the "Agreement on Prohibition of Attack against Nuclear Facilities" signed by the two countries in December 1988. They agree to embark on the agreement's implementation and exchange the instruments of ratification in January 1991.

—"Pakistan and India to Implement Accord on Nuclear Plant Attacks," *Nucleonics Week*, 3 January 1990, p. 3.

13 November 1990

The first committee of the 45th UN General Assembly approves the draft resolution calling for disarmament at regional and sub-regional levels. The draft was proposed by Pakistan and 10 other nations. In an explanatory note, India's representative to the UN says that the Indian government does not support the draft since it undermines the positive points contained in two drafts sponsored by India.

—"Draft on Regional Disarmament Approved at UN Committee," Xinhua General Overseas News Service, 13 November 1990; in Lexis-Nexis Academic Universe, 14 November 1990, <http://web.lexis-nexis.com>.

9 November 1990

Purnima-III, a zero-energy research reactor, using U-233 as fuel, goes critical. The reactor is located at the Bhabha Atomic Research Center (BARC). U-233 fuel for the reactor is obtained by irradiation of thorium rods in the CIRUS research reactor. According to a BARC press release, the reactor has a fissile fuel inventory of 590g of U-233 in the

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form of uranium aluminum alloy plates, moderated by light water and reflected by beryllium oxide. Its nuclear core volume is less than 10 liters. According to BARC director R. Chidambaram, Purnima-III is the only reactor in the world to be fully fuelled by U-233.

—"Bhabha Center Research Reactor Goes Critical, U-233 Fuel Used," *Hindu* (Chennai), 14 November 1990, p. 6; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 24; "Further Details," *Times of India* (Mumbai), 15 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 24.

5 November 1990

Talking to the reporters after inaugurating the second Indo-USSR symposium on the research in the field of rare earths materials in Chennai, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says negotiations with the USSR on two VVER-1000 plants to be built in Koodankulam (Tamil Nadu) are in progress "on various details." Iyengar also mentions the plans to construct a 500MW PHWR-type nuclear plant in Kerala. He says a team led by Mr. S. Krishnan from the Nuclear Power Corporation is currently inspecting various possible sites in northern Kerala. According to Iyengar, PHWRs used by India not only meet all international safety standards but they are intrinsically safer than Chernobyl-type reactors because they have a much smaller nuclear core. Iyengar adds that the Indian atomic energy establishment will be able to finance new projects from its own profits within five to ten years. He argues that nuclear power is cheaper than thermal power "when the coal mine is away from the thermal plants."

—"AEC Chairman on Plans for Nuclear Power Plants," *Hindu* (Chennai), 6 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 22; "AEC Chairman Opens Nuclear Power Seminar," *Hindu* (Chennai), 6 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 22.

30 October 1990

Speaking on Bhabha Atomic Research Center (BARC) Founder's Day, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says that "a cultural change in [India's] approach will be needed" if India wants to succeed in exporting nuclear-related technologies since India will have to meet reliability and quality control standards, lead-times and cost targets. India will have to interact with the international community more intensively to familiarize itself with the requirements. In Iyengar's view, this will impose greater responsibilities on the scientists and technicians to meet the standards promptly. Iyengar emphasizes the importance of increased interaction between production and research units.

—"AEC Chairman Discusses Nuclear Technology Export," *Times of India* (Mumbai), 31 October 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 21.

8 September 1990

Speaking in Mumbai, Atomic Energy Commission (AEC) Chairman P.K. Iyengar says India will install 3,000MW of nuclear generating capacity during the eighth plan and an additional 1,000MW during the ninth plan. According to Iyengar, India now has the capability to indigenously "design, engineer, build and operate" nuclear power plants.

—"India Plans to Set up Additional Nuclear Capacity" Xinhua General Overseas News Service, 8 September; in Lexis-Nexis Academic Universe, 9 September 1992, <http://web.lexis-nexis.com>.

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4 September 1990

India's Minister of Energy A.M. Khan tells parliament that India will need an additional 38,000MW of nuclear energy during the Eighth Five Year plan in order to meet the energy needs.

—"India's Additional Electricity Needs in 1990-95," Xinhua General Overseas News Service, 5 September 1990; in Lexis-Nexis Academic Universe, 13 February 1992, <http://web.lexis-nexis.com>.

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—"AEC Chairman on Plans for Nuclear Power Plants," *Hindu* (Chennai), 6 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 22; "AEC Chairman Opens Nuclear Power Seminar," *Hindu* (Chennai), 6 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 22.

9 November 1990

Purnima-III, a zero-energy research reactor, using U-233 as fuel, goes critical. The reactor is located at the Bhabha

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Atomic Research Center (BARC). U-233 fuel for the reactor is obtained by irradiation of thorium rods in the CIRUS research reactor. According to a BARC press release, the reactor has a fissile fuel inventory of 590g of U-233 in the form of uranium aluminum alloy plates, moderated by light water and reflected by beryllium oxide. Its nuclear core volume is less than 10 liters. According to BARC director R. Chidambaram, Purnima-III is the only reactor in the world to be fully fuelled by U-233.

—"Bhabha Center Research Reactor Goes Critical, U-233 Fuel Used," *Hindu* (Chennai), 14 November 1990, p. 6; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 24; "Further Details," *Times of India* (Mumbai), 15 November 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 24.

13 November 1990

The first committee of the 45th UN General Assembly approves the draft resolution calling for disarmament at regional and sub-regional levels. The draft was proposed by Pakistan and 10 other nations. In an explanatory note, India's representative to the UN says that the Indian government does not support the draft since it undermines the positive points contained in two drafts sponsored by India.

—"Draft on Regional Disarmament Approved at UN Committee," Xinhua General Overseas News Service, 13 November 1990; in Lexis-Nexis Academic Universe, 14 November 1990, <http://web.lexis-nexis.com>.

December 1990

Foreign Secretaries Muchkund Dubey of India and Shahryar Khan of Pakistan conduct a third round of talks on the "Agreement on Prohibition of Attack against Nuclear Facilities" signed by the two countries in December 1988. They agree to embark on the agreement's implementation and exchange the instruments of ratification in January 1991.

—"Pakistan and India to Implement Accord on Nuclear Plant Attacks," *Nucleonics Week*, 3 January 1990, p. 3.

December 1990

India and Egypt sign an agreement on cooperation in the peaceful uses of nuclear energy in several fields, including radiation technology for medicine and industry. The agreement is to come into effect in January 1991 and will be valid for five years, after which it can be renewed. According to the Egyptian nuclear expert, Dr. Raja'l Zaghlul, India will cooperate with Egyptian experts to increase the capacity of the Egyptian research reactor from two to five megawatts.

—"Pact Signed with India on Nuclear Cooperation," Cairo MENA, 10 December 1990; in FBIS Document JPRS-TND-91-001, 4 January 1991, p. 21.

11 December 1990

Officials in India's Department of Atomic Energy (DAE) say that India's fast breeder reactor program may be delayed for three to five years due to the problems with India's fast breeder test reactor (FBTR) at Kalpakkam. The Kalpakkam FBTR, commissioned in 1985, was designed to generate 40 million watts of thermal power and 13 million watts of electricity. To date, the reactor has not produced electricity and has been idle most of the time.

—"India's Fast Breeder Reactor Program in Jeopardy," Xinhua General Overseas News Service, 11 December 1990; in Lexis-Nexis Academic Universe, 12 December 1990, <http://web.lexis-nexis.com>; N. Vasuki Rao "More Problems

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Beset India's Nuclear Program," *Journal of Commerce*, 19 December 1990; in Lexis-Nexis Academic Universe, 12 December 1990, <http://web.lexis-nexis.com>.

13 December 1990

US President George Bush approves the sale of Cray supercomputers to Brazil, India, and China. He orders new controls on export licenses for the sensitive, advanced technology equipment. In a written statement, White House press secretary Marlin Fitzwater says, "The president approved several of the license applications, but because of the potential strategic applications of such computers, he also required the imposition of stringent safeguards to ensure that the computers will be used exclusively for peaceful civilian purposes."

—"President Approves Supercomputer Exports," *Associated Press*, 13 December 1990; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

17 December 1990

Indian Foreign Secretary Muchkund Dubey arrives in Islamabad to discuss Pakistan's proposal for a bilateral or regional agreement on nuclear nonproliferation in South Asia.

—"Indian and Pakistani Officials Renew Nonproliferation Talks," *Nucleonics Week*, 20 December 1990, p. 13.

19 December 1990

US President George Bush offers assistance in "normalizing relations between Pakistan and India."

—"Pakistan and India to Implement Accord on Nuclear Plant Attacks," *Nucleonics Week*, 3 January 1990, p. 3.

20 December 1990

India and Pakistan agree to ratify the "Agreement on Prohibition of Attack against Nuclear Facilities" signed by the two countries in December 1988. A joint statement indicates that the two sides will ratify the agreement in January 1991.

—"Pakistan, India to Ratify Confidence-Building Accord," *Japan Economic Newswire*, 20 December 1990; in Lexis-Nexis Academic Universe, 20 December 1990, <http://web.lexis-nexis.com>; "India: Talks with Pakistan Yield Mixed Results," *Inter Press Service*, 21 December 1990; in Lexis-Nexis Academic Universe, 23 December 1990, <http://web.lexis-nexis.com>; Steve Coll "Ban is Imposed on Attacks Nuclear Installation," *Washington Post*, 21 December 1990; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

24 December 1990

Former defense minister and a senior Congress party leader, K.C. Pant, publicly emphasizes that India has no option but to possess nuclear weapons to counter the nuclear threat from Pakistan. He says it is important to raise awareness "of the dangers of nuclear asymmetry — when one side has a capability well ahead of the other." Pant argues that an Indian nuclear capability will eliminate the potential for miscalculation or misadventure on Pakistan's part.

Pant says the problem of a potential nuclear threat from Pakistan must be addressed in detail at different levels of the government (both military and civil), as well as the international community. He warns against downplaying the threat from Pakistan.

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—"Pant Says Nuclear Weapon Needed," *Patriot* (New Delhi), 25 December 1990; in FBIS Document JPRS-TND-91-003, 25 February 1991, p. 29.

31 December 1990

India's former Chief of the Army Staff General K. Sundarji discusses the importance of India and Pakistan adopting "a declared nuclear weapon status" to reduce the chances of miscalculation and send clear signals of deterrence to each other. Sundarji says, "the differences between India and Pakistan, in geography, may cause proportionately more damage to Pakistan. But the damage to India will be in absolute terms. The nuclear reality demands that on neither side can a planner recommend nor any decisionmaker accept any step that would have a high probability of leading to a nuclear exchange." He says both sides should have a clear understanding of what constitutes their "vital interests" a threat to which could lead to nuclear exchange. He says a debate within each country and between both countries can facilitate these issues. Sundarji adds it is essential that India embarks on confidence building measures with her smaller neighbors allaying their "Kuwait syndrome" by providing them with "a few short to medium range weapon systems" without conditions.

—General K. Sundarji "Declare Nuclear Status," *India Today*, 31 December 1990, p. 73.

1990

India accelerates efforts to build an air-deliverable nuclear device that can be delivered on board Indian Air Force (IAF) Mirage 2000 multi-role combat aircraft. Coordination between the IAF and the Defense Research and Development Organization (DRDO) is increased. Weaponization work is undertaken at three DRDO labs: Armament Research and Development Establishment (ARDE), Terminal Ballistics Research Laboratory (TBRL), and the Electronics Research and Development Establishment (LRDE). ARDE accelerates work on the container for the bomb, mating mechanisms with aircraft, and fail-safe release mechanisms. TBRL works on efforts to reduce the weight of the bomb by optimizing the size of the conventional explosive lens needed to implode the fissile core. A plant is set up to manufacture lighter HMX-TNT explosives as well as more reliable detonators. LRDE designs high-voltage capacitors for the bomb's triggering mechanisms. The weaponization design team begins examining the following aspects of the weapon design: the optimum shape and weight of the bomb; designing and building a bomb container that can withstand the stress and strains of an aircraft in flight; fail-safe electronic trigger mechanisms with safety locks; special communication systems that will enable aircraft pilots to remain in constant touch with ground controllers so that they can be recalled; trade-offs involved in deploying a single man or alternatively two man crew; psychological training for pilots involved in nuclear operations; and possible storage sites for the weapons to ensure speedy access, deployment, and use.

—Raj Chengappa, "End the Wink and Nudge Approach," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: Harper Collins Publishers India, 2000), pp. 359-360.

1990

The managing director of the Nuclear Power Corporation (NPC) says that India's nuclear program is expected to produce 10,000MW of energy by the year 2000; a target, which if accomplished, would meet 10 percent of India's electricity requirements. The Indira Gandhi Center for Atomic Research (IGCAR) announces that it will submit a report to the government for building a 500MW prototype fast breeder reactor at Kalpakkam. The proposed reactor will use a mixed plutonium-uranium carbide fuel and liquid sodium as a coolant. The estimated cost of the

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project is \$580 million. However, the commissioning of the heavy water plant at Manuguru (Andhra Pradesh) is delayed until mid-1990.

—"India," *Nuclear Engineering International*, June 1990, p. 24.

1990

Environmentalists and economists protest against the construction of two Russia-supplied VVER-1000 reactors in Koodankulam (Tamil Nadu state). They cite "horrible safety records" of this type of reactors.

—A.S. Paneersilvan, "Opposition Stalls Nuclear Power Program," Inter Press Service, 30 July 1990; in Lexis-Nexis Academic Universe, 1 August 1992, <http://web.lexis-nexis.com>.

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1989

January 1989

The US Central Intelligence Agency (CIA) believes it has information that suggests India is working on a thermonuclear weapons development program. In 1989, India imported beryllium from West Germany; beryllium is apparently required in the production of thermonuclear weapons.

—Sanjiv Prakash "Is India Making a Thermonuclear Weapon," *Defense and Foreign Affairs Weekly* (Alexandria, VA), 15-21 January, 1990, p. 1.

6 January 1989

An official spokesperson from the Indian Ministry of External Affairs denies reports that India illegally imported "reflective material and cadmium tubes" from the West German firms of Neue Technologie GmbH (NTG) and Physikalisch-Technische Beratung (PTB) between 1982-88. These two items are considered nuclear-related material. The spokesperson says the reflective materials used in Indian research reactors are beryllium-oxide, graphite, and heavy water. Therefore, "no such reflective material has been imported from West Germany." He adds that India had imported some cadmium-bearing stainless tubes from NTG, but only after an open competitive bid.

—"India Denies Importing Nuclear Material from Germany," Xinhua (Beijing), 6 January 1989; in Lexis-Nexis Academic Universe, 6 January 1989, <http://web.lexis-nexis.com>.

9 January 1989

Director of the Indira Gandhi Center for Atomic Research (IGCAR) C.V. Sundaram reports that Kamini, India's first research reactor to use uranium-233 as fuel, is expected to be commissioned in June at Kalpakkam. Sundaram says Kamini "is being set up as a first step in harnessing the energy potential in abundant thorium resources in the country." The reactor will be primarily used as a source of "neutrons for radiography, neutron activation analysis and radiation physics experiments." Kamini is the world's first reactor to use uranium-233. When commissioned, it will be India's sixth research reactor.

—"India's First Uranium-233 Research Reactor to be Commissioned in June," Xinhua (Beijing), 9 January 1989; in Lexis-Nexis Academic Universe, 6 January 1989, <http://web.lexis-nexis.com>.

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29 January 1989

The West German magazine *Der Spiegel* reports the West German government allowed Degussa, a West German Firm located near Frankfurt, to provide the Bhabha Atomic Research Center (BARC) with 95kg of beryllium.

Beryllium can act as a neutron deflector in the manufacture of nuclear weapons.

—"Germans Allowed Nuclear Export to India, Magazine Says; Degussa," Kyoto News Service (Tokyo), 29 January 1989; in Lexis-Nexis Academic Universe, 30 January 1989, <http://web.lexis-nexis.com>.

2 February 1989

The West German Firm Degussa AC confirms it exported 95kg of US-origin beryllium (Be) without US government authorization to India's Bhabha Atomic Research Center (BARC) in 1984. Degussa officials say they only exported the Be after receiving export permits from Bonn. A Spokesperson from the Federal Ministry of Research & Technology (BMFT) in Bonn says, "We have nothing in our files clarifying the 1984 export." However, according to a note from export officials at the German Foreign Office dated 12 March 1984, the BMFT reviewed the export in writing, concluding that "information obtained in the meantime has confirmed the plausibility of the alleged end-use" for the Be, writes *Nuclear Fuel*. According to export officials, the Be exported to BARC was not pure enough to be used in India's nuclear weapons program. In a note dated 13 December 1983, the Foreign Office stated, Be is nuclear-relevant "only when it is at least 99.5 percent pure." The beryllium shipped to India was believed to be between 98 percent and 99 percent pure. One West German source believes the BMFT blundered in licensing the Be shipment to India because they confused the nuclear relevance of Be metal to that of Be nitrate, a compound that has no nuclear relevance. In reviewing an application of Be nitrate shipment to Pakistan dated 27 September 1983, BMFT "has ascertained many times in the past that chemical compounds of Be have no nuclear relevance." US officials say that Be nitrate can act as a "good intermediate compound" and with no trouble be converted into Be oxide and then Be metal. "If all you can get is Be nitrate, you have a lot cheaper source of BE metal than the raw ore," says one US source.

—Mark Hibbs and Michael Knapik, "Some German Officials Puzzled by Okay for Beryllium Export to India," *Nuclear Fuel*, 20 February 1989, p. 10.

6 February 1989

During an interview with the *Times of India*, French Minister of Research and Technology Hubert Curien states France has offered to sell India two enriched uranium-fuelled, pressurized water reactors of 900MW each. Curien also offers cooperation in the other sophisticated nuclear technology areas such as fast breeder reactors and laser uranium enrichment technology. New Delhi has specifically requested that France participate in a turn-key project. *Nucleonics Week* reports that India expects a "technology transfer to accompany the reactor offer, which will lead to joint construction of nuclear plants with a higher content of Indian manufactured components. French Prime Minister Mitterrand reiterated that any French participation in India's nuclear industry will follow the London nuclear exporters' guidelines and post-1978 French nuclear export policy.

—"France offers two Nuclear Thermal Reactors to India," Xinhua (Beijing), 6 February 1989; in Lexis-Nexis Academic Universe, 6 February 1989, <http://web.lexis-nexis.com>; Ann Mac Lachlan, "French Industry Gearing up For Renewed Cooperation with India," *Nucleonics Week*, 16 February 1989, pp. 1, 11.

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12 March 1989

The Narora nuclear reactor reaches criticality and is expected to begin commercial operations within six months.

—"India: Narora Reactor Generates First Electricity," *Nucleonics Week*, August 1989, p. 18.

13 March 1989

Indian Minister of State for Science and Technology K.R. Narayanan informs parliament that the first unit of the Narora nuclear power station in Uttar Pradesh has gone critical. The Narora nuclear power facility consists of two 235MW pressurized heavy water reactors. Both use natural uranium as fuel, and heavy water as a moderator and coolant. The first unit is expected to reach full commercial operating capacity in six months. With the commissioning of the Narora plant, India now has three nuclear power stations in operation with a total installed capacity of 1,230MW.

—"Narora Nuclear Power Station goes Critical in India," Xinhua (Beijing), 13 March 1989; in Lexis-Nexis Academic Universe, 13 March 1989, <http://web.lexis-nexis.com>.

29 March 1989

Indian Minister of State for External Affairs Natwar Singh reiterates India's position on signing a bilateral or regional agreement with Pakistan on the nuclear issue. He says any bilateral or regional proposal by Pakistan has "never been acceptable to us (India) as we feel that this issue can only be tackled on a global basis, given the global reach of nuclear weapons." Pakistan has proposed that all the South Asian countries, including India, sign a regional nuclear nonproliferation treaty and declare the region a zone of peace.

—"India Reiterates Stand against Pakistan Proposal on Nuclear Issue," Xinhua (Beijing), 29 March 1989; in Lexis-Nexis Academic Universe, 29 March 1989, <http://web.lexis-nexis.com>.

6 April 1989

The Managing Director of India's Nuclear Power Corporation (NPC), S.L. Kati, says the Gandhi government has approved a proposal to "install six 500MW power units, of which four will be located in the Rajasthan Atomic Power Station, and two in Tarapur," with a total investment of 90 billion rupees (about \$6 billion). The NPC is awaiting clearance for an additional six 500MW nuclear units. India's current installed nuclear power capacity is 1,230MW.

—"India Poised to Reach 10,000MW Nuclear Power by 2000," Xinhua (Beijing), 6 April 1989; in Lexis-Nexis Academic Universe, 6 April 1989, <http://web.lexis-nexis.com>.

3 May 1989

K.R. Narayanan, Minister of State for Atomic Energy, tells parliament India will establish three nuclear fuel plants in order to indigenously produce nuclear fuel for power reactors, seamless stainless steel tubes and zircaloy components required for the country's nuclear program. The new plants will be set up in Hyderabad (Andhra Pradesh), Turandih (Bihar State) and Palayakayal (Tamil Nadu State) at a cost of 12,000 million rupees (\$800 million).

—"India to Set up Nuclear Fuel Components Plants," Xinhua (Beijing), 3 May 1989; in Lexis-Nexis Academic Universe, 3 May 1989, <http://web.lexis-nexis.com>.

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5 May 1989

The Department of Atomic Energy's (DAE) annual report for 1988-89 states India's nuclear power generation increased to 6,068 million units in 1988, an increase of 14 percent from the previous year.

—"6,068 Million Units of Nuclear Power Generated in India in 1988," Xinhua (Beijing), 5 May 1988; in Lexis-Nexis Academic Universe, 5 May 1989, <http://web.lexis-nexis.com>.

11 May 1989

C.V. Sundaram, director of the Indira Gandhi Center for Atomic Research (IGCAR) at Kalpakkam, tells the Press Trust of India that India's fast breeder test reactor (FBTR) has been restarted. Originally commissioned in 1985, the 40MW experimental reactor was shut down in May 1987 because of a fuel handling mishap. Sundaram adds the "fast breeder reactor is using indigenously made plutonium-uranium carbide fuel." An FBTR reactor produces more plutonium than it actually consumes as fuel.

—"India's Fast Breeder Test Reactor Restarted," Xinhua (Beijing), 13 May 1989; in Lexis-Nexis Academic Universe, 13 May 1989, <http://web.lexis-nexis.com>.

23 June 1989

India and Pakistan are readmitted to the Nuclear Power Plant Operators Safety Group, which comprises countries using Canadian supplied nuclear power systems. Other member countries in the group include Canada, Romania, South Korea, and Argentina. India was suspended from the group after it exploded its first nuclear device in 1974. Similarly, Pakistan was suspended in 1976, when it refused to sign the Nuclear Non-Proliferation Treaty (NPT).

—"Pakistan, India Rejoin N-Power Plant Operations Group," Kyodo News Service (Tokyo), 23 June 1989; in Lexis-Nexis Academic Universe, 23 June 1989, <http://web.lexis-nexis.com>.

8 July 1989

In a lecture on "Nuclear Power – Technological and Managerial Challenges" in Hyderabad, Atomic Energy Commission (AEC) Chairman M.R. Srinivasan says India's objective of "self-reliance in nuclear power is being fully achieved in the sense that by 2000, 26 of the 32 reactors then in operation will be based on indigenous design and technology." Current estimates suggest India has uranium resources to support 10,000-15,000MW generating capacity.

—"India to Build Two Big Nuclear Reactors with Soviet Help," Xinhua (Beijing), 8 July 1989; in Lexis-Nexis Academic Universe, 23 June 1989, <http://web.lexis-nexis.com>.

16 July 1989

During a banquet honoring Indian Prime Minister Rajiv Gandhi, Pakistani Prime Minister Benazir Bhutto says her country is willing to enter into "any arrangement" that would prevent the spread of nuclear arms in South Asia. "We should insure South Asia remains free of nuclear weapons," Bhutto says. Indian officials say New Delhi will not accept any Indo-Pakistani agreement on banning nuclear weapons in South Asia because it would not include China.

—Sanjoy Hazarika, "At Reception for Visiting Gandhi, Bhutto Urges Nuclear Arms Ban," *New York Times*, 16 July 1989, p. A2; in Lexis-Nexis Academic Universe, 17 July 1989, <http://web.lexis-nexis.com>.

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18 July 1989

Indian Prime Minister Rajiv Gandhi claims that Pakistan's nuclear program is not under the control of Benazir Bhutto's civilian government. He says, "Unlike our program, which is open and discussed in parliament, theirs is under the control of the military. Pakistani Prime Minister Benazir Bhutto replies that her government is in full control of Pakistan's nuclear program.

—"Bhutto and Gandhi Clash on N-Power," *Financial Times* (London), 18 July 1989; in Lexis-Nexis Academic Universe, 18 July 1989, <http://web.lexis-nexis.com>.

29 July 1989

The first unit of the Narora Atomic Power Station (NAPS) is synchronized with India's northern power grid. Located in the northern state of Uttar Pradesh, the Narora station "consists of two pressurized heavy water reactors with a 235MW capacity each, using natural uranium as fuel and heavy water as a moderator and coolant." The second unit is scheduled to reach criticality by May 1990.

—"Narora Atomic Power Station Synchronized with Northern Power Grid in India," Xinhua (Beijing), 1 August 1989; in Lexis-Nexis Academic Universe, 1 August 1989, <http://web.lexis-nexis.com>; "India: Narora Reactor Generates First Electricity," *Nucleonics Week*, August 1989, p. 18.

27 August 1989

Head of Bhabha Atomic Research Center's (BARC) radiometallurgy division, C. Ganguly announces that BARC has successfully fabricated fuel sub-assemblies of uranium-233 to be irradiated by Kamini, India's new 30MW light water research reactor, reports *Nucleonics Week*. Located at BARC, Kamini will be the first reactor in the world to use U-233 as a core fuel. He says U-233 is the most efficient form of fissile material used in thermal reactors, and is produced from naturally occurring thorium-232, of which India has abundant natural reserves totaling 360,000MT. Kamini is expected become critical this fall.

—Neel Patri, "India Claims Success in Fabricating U-233 Fuel Subassemblies for Kamini," *Nucleonics Week*, 4 September 1989, p. 7.

8 September 1989

K. Balaramamoorthy, Chief Executive of the Nuclear Fuels Complex (NFC) located in Hyderabad, reports that "seamless calandria tubes" have been manufactured at the NFC. Calandria tubes act as a barrier between the moderator and the hot pressure tubes. Tests have shown calandria tubes "neither contract nor elongate during the life time of the reactor," and are considered "superior to the existing seam-welded tubes as they have better mechanical, metallurgical and structural properties."

—"India Develops Seamless Calandria Tubes for Nuclear Reactors," Xinhua (Beijing), 8 September 1989; in Lexis-Nexis Academic Universe, 8 September 1989, <http://web.lexis-nexis.com>.

15 October 1989

Prime Minister Rajiv Gandhi formally commissions the first unit of the Narora Atomic Power Station (NAPS), India's fourth atomic power station. Since the unit was synchronized with India's northern power grid on 29 July, it has been running at 50 percent capacity under testing. The unit will begin full commercial operations by the end of 1989.

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—"1st Unit of the 4th Indian Nuclear Power Station Commissioned," Xinhua (Beijing), 16 October 1989; in Lexis-Nexis Academic Universe, 16 October 1989, <http://web.lexis-nexis.com>.

10 November 1989

The first committee of the United Nations (UN) Assembly approves a draft resolution calling on the states of South Asia to establish a nuclear-weapons-free zone in the region. The resolution, sponsored by Pakistan and Bangladesh, is adopted by a vote of 102 in favor and three against (India, Bhutan, and Mauritius), with 30 abstentions. The original concept of a South Asian nuclear-weapons-free zone was proposed by Pakistan in 1974 during the 29th UN General Assembly.

—"UN Resolution Adopted to Establish Nuclear-Weapons-Free Zone in South Asia," Xinhua (Beijing); 10 November 1989; in Lexis-Nexis Academic Universe, 10 November 1989, <http://web.lexis-nexis.com>.

10 November 1989

India indigenously manufactures a boiler feed pump for use in nuclear power plants at the Bharat Heavy Electrical Plant (BHEL) in Hyderabad. The pump is scheduled to be used in the 235MW nuclear power station at Kakrapar in Gujarat.

—"Pump for Nuclear Power Plant Produced Indigenously," New Delhi Home Service; 10 November 1989; in Lexis-Nexis Academic Universe, 22 November 1989, <http://web.lexis-nexis.com>.

6 December 1989

In a reply to the newly elected Indian Prime Minister V.P. Singh's statement, in which he proposes a dialogue with Pakistan on the nuclear issue, Pakistan calls on the new Indian government "to cooperate in turning South Asia into a nuclear-weapon-free-zone." Pakistan also urges the Singh government to accept Pakistan's previous plan under which South Asia would be declared a nuclear-weapons-free zone; India and Pakistan would make a joint declaration not to produce nuclear weapons; both countries would place their nuclear installations under International Atomic Energy Agency (IAEA) safeguards; both countries would allow bilateral mutual nuclear inspections; both countries would simultaneously sign the Nuclear Non-Proliferation Treaty (NPT); and India and Pakistan would renounce nuclear testing, and sign a nuclear test ban treaty.

—"Pakistan Urges India to Cooperate for Nuclear-Free South Asia," Xinhua (Beijing), 6 December 1989; in Lexis-Nexis Academic Universe, 6 December 1989, <http://web.lexis-nexis.com>.

18 December 1989

After meeting with new Indian Prime Minister Vishwanath Pratap Singh in New Delhi, International Atomic Energy Association (IAEA) Director Hans Blix says he does not foresee any change in India's policy regarding the Non-Proliferation Treaty (NPT). He says, "I have the impression that there is no modification in the Indian nuclear policy." M.R. Srinivasan, Chairman of the Indian Atomic Energy Commission (AEC) says only Tarapur and Rajasthan nuclear power facilities are under international safeguards due to bilateral agreements with the United States and Canada. The two proposed 1,000MW reactors from the Soviet Union will also be under safeguards. "The rest of the Indian plants will not come under safeguards," Srinivasan says.

—"Blix Sees No Change in India's NPT Policy," *Nucleonics Week*, 21 December 1989, p. 13.

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1988

6 January 1988

India takes possession of a leased nuclear powered submarine from the Soviet Union at the port city of Vladivostok in the Soviet Far East. The Press Trust of India reports that the submarine has been leased for training purposes; there are no nuclear weapons or munitions of any type on board.

—Soviets Lease Nuclear Powered Sub to India," Press Trust of India, 6 January 1988; in Lexis-Nexis Academic Universe, 6 January 1988, <http://web.lexis-nexis.com>.

10 January 1988

British Defense Secretary George Younger says Britain is prepared to sell India a wide range of advanced defense equipment, without any preconditions, including jet fighters and a nuclear powered aircraft carrier. During an interview with Press Trust of India, Younger says his discussions with India's military officials have "opened a 'wide scope for further cooperation...in the field of defense'."

—"Britain Ready to Supply India with Advanced Weapons," UPI, 10 January 1988; in Lexis-Nexis Academic Universe, 10 January 1988, <http://web.lexis-nexis.com>.

3 February 1988

Prime Minister Rajiv Gandhi accepts the Soviet nuclear powered submarine at the Visakhapatnam naval base in southern India. The 670A Skat series (NATO-designated Charlie-class) submarine is renamed the *INS Chakra*. Indian officials say the Soviet Union will be responsible for regular inspections of the submarine's nuclear power generator, supply future fuel needs, and control its spent fuel. The *INS Chakra* reportedly has two 40MW nuclear reactors.

—Adam Keller, "Gandhi Accepts Soviet Nuclear Sub," UPI, 3 February 1988; in Lexis-Nexis Academic Universe, 3 February 1988, <http://web.lexis-nexis.com>; "India Commissions Soviet Sub," *Nucleonics Week*, 11 February 1988, p. 16.

7 February 1998

Unit 1 of the Madras Atomic Power Station (MAPS-1) is re-synchronized to the grid after being shut down on 19 October 1987 for annual maintenance. MAPS-2 is still down while technicians replace the turbine first's stage blades.

—"Notes Pertaining to the Generating Table for February 1998: India," *Nucleonics Week*, 31 March 1988, p. 12.

24 February 1988

India proposes to increase its uranium production capacity to 40,000 tons annually in order to meet the goal of producing 10,000MW of nuclear power by the year 2000. The Uranium Corporation of India Limited (UCIL) says it will open two new uranium mines at Narwapahar and Turanmdih where 1,500 tons of uranium ore will be mined daily. Furthermore, UCIL Chairman M.K. Batra states any short fall in uranium resources would be made up by "large deposits of monazite containing thorium, which [is] a potential source of nuclear energy." Thorium is

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produced from monazite sands in Chavra and Manavalakurchi in Kerala state. It is processed at a thorium facility in Trombay (Maharashtra state) and another facility at Chhatarpur (Orissa state).

—"India Plans to Boost Nuclear Power Capacity," Xinhua (Beijing), 24 February 1988; in Lexis-Nexis Academic Universe, 24 February 1988, <http://web.lexis-nexis.com>.

28 February 1988

Prime Minister Rajiv Gandhi reiterates that the recently acquired nuclear-powered submarine from the Soviet Union is for training purposes only and does not carry nuclear weapons. However, some analysts contend that leasing the Soviet submarine shows "India's long-term aim to build a navy capable of projecting its power far beyond its shores."

—Adam Kelliher, "Indian Nuclear Sub; Nuclear Sub Causes Regional Concern," UPI, 28 February 1988; in Lexis-Nexis Academic Universe, 28 February 1988, <http://web.lexis-nexis.com>.

10 March 1988

The Comptroller and Auditor General of India releases a report to parliament criticizing the delays in India's nuclear program and expressing doubts whether it will be able to reach the goal of 10,000MW generating capacity by the year 2000. The report points out that back in 1954, the Atomic Energy Commission (AEC) set a goal of 8,000MW generating capacity by 1980-81, but in 1968 revised the target to 2,700MW. In 1981, India's total nuclear generating capacity was only 640MW. In 1978-79 the AEC released a four-stage development plan for India's nuclear energy program which called for:

Establishing natural uranium-fuelled, heavy water-moderated nuclear reactors;

Building advanced 500MW thermal nuclear reactors;

Constructing plutonium-fueled fast breeder reactors; and

Establishing thorium-cycle fast breeder reactors.

In comparison to the AEC's nuclear development plan, India's is far behind in its stated goals. The report says the first stage has only been "partially achieved." The second stage involves more advanced technology and has not been "attempted on the ground, as yet." The third and fourth stages which "involve development of new technologies are at experimental levels and their fructification is very much in the future." The report notes that one of the AEC's goals was to have India's nuclear program "based on self-reliance and indigenous technology." However, the short comings are primarily due to the lack of resources, and a reliance on foreign vendors for spare supplies and components.

The report also provides details about the Madras Atomic Power Station (MAPS). The MAPS-1 project took eight years and six months longer than expected to reach criticality, and MAPS-2 took eight years and eight months. The report shows that the DAE blamed the overruns and delays on the nuclear related embargo imposed by the United States and Canada after the 1974 nuclear test, cancellation of orders, identification of alternative suppliers, indigenization of nuclear related equipment and organization, and the adoption of a reactor system based on a

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pressurized water design. The report notes that the DAE made similar excuses prior to the MAPS project, but did not apply any lessons learnt. It states, "MAPS-1 and -2 were also delayed for similar reasons." Fiscally, the cost overruns of the MAPS-1 were nearly 570.50 million rupees (about \$43.885 million) and for MAPS-2 was 564.10 million rupees. The report says an analysis of the cost overrun shows that "while there was marginal decrease in the foreign exchange component which is attributed to the Canadian embargo and the subsequent indigenization, the Indian components of the expenditure had registered an increase of more than 100 percent."

Among the report's other findings:

Despite the long construction period of the MAPS-1 plant, the cost of foreign components did not escalate appreciably, but the cost of indigenous components rose steeply.

The 1972 projections that heavy water production would out-pace demand by 1979 fell short. The four heavy water plants at Tuticorin, Talcher, Baroda, and Kota all failed to meet stipulated production targets.

—Neel Patri, "Indian Nuclear Energy Program Lagging and Costly, Says Report," *Nucleonics Week*, 10 March 1988, pp. 13-14.

14 March 1988

The Bhabha Atomic Research Center (BARC) announces that the 30KW Kamini nuclear reactor, fueled by uranium-233, will be commissioned at Kalpakkam near Madras in southern India. Kamini is the first Indian reactor to "run on fuel derived from beach sands of Kerala and Tamil Nadu," reports Xinhua. Known as the "third fuel," uranium-233 is derived from thorium, found in beach sand, after it is irradiated by neutrons. BARC says that a new facility is also being built to extract uranium-233 from irradiated thorium rods.

—"India to Commission 'Third Fuel' Atomic Reactor," Xinhua (Beijing), 14 March 1988; in Lexis-Nexis Academic Universe, 14 March 1988, <http://web.lexis-nexis.com>.

17 March 1988

Minister of State for External Affairs, Natwar Singh tells Rajya Sabha (India's upper house of parliament) that New Delhi has "forcefully" told Pakistan that its "relentless pursuit" of nuclear weapons was "grave and serious." He says, "This will be suitably answered and India will not allow its national or security interests to be jeopardized." Singh's remarks come in the wake of a *New York Times* article which claims Pakistan "has acquired the capability of manufacturing small nuclear bombs which could be carried on US-made F-16 or French-made Mirage-5 aircraft."

—"India Threats to Review Nuclear Options," Xinhua (Beijing), 17 March 1988; in Lexis-Nexis Academic Universe, 17 March 1988, <http://web.lexis-nexis.com>.

17 March 1988

The Indian government announces it will budget the Nuclear Power Corporation of India Ltd. (NPCIL) some 4.6132 billion rupees (about \$354.86 million) for the fiscal year 1988-89 for running India's commercial nuclear power stations and for new projects. This is up from 3.75 billion rupees that New Delhi allocated NPCIL the previous year. The government also allocated nuclear related research development projects (R&D) 7.328 billion rupees (about \$563.69 million), compared with 6.9602 billion rupees in the 1987-88 budget cycle. NPCIL was established on 17

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September 1987 with an initial operating budget of 20-million rupees. It was started to "plan and execute an integrated program" of developing India's commercial nuclear energy capacity.

—India Increases Funding For Nuclear Projects," *Nucleonics Week*, 17 March 1988, p. 11.

19 March 1988

According to US intelligence sources, former National Security Council officials, and congressional staffers, India currently has "a handful of highly sophisticated low-yield atomic bombs that can be delivered to targets by combat aircraft," reports UPI. US government sources believe that India possess around 20 air-deliverable nuclear devices, which could be carried by India's fleet of MiG-27, Mirage 2000, and Jaguar fighter bombers; Indian Air Force Jaguars have been noticed doing "flip-toss maneuvers," a technique used to deliver nuclear weapons. There is also evidence to suggest that India may have developed a warhead for deployment on a 200-mile range surface-to-surface missile. A Central Intelligence Agency (CIA) source alleges that "India did not stop in 1974" when it detonated its first nuclear device in May of that year. Furthermore, the number of nuclear devices in India's possession may be higher because New Delhi does not deactivate older weapons.

—Richard Sale, "Exclusive India Said to Upgrade Nuclear Arsenal," UPI, 19 March 1988; in Lexis-Nexis Academic Universe, 19 March 1988, <http://web.lexis-nexis.com>.

21 March 1988

P.K. Kaul, India's ambassador to the United States, dismisses the UPI report (dated 19 March 1988) that claims India has developed several air deliverable, low-yield nuclear warheads, and a nuclear warhead for a surface-to-surface missile. The Press Trust of India reports Kaul as stating, "It is a figment of their imagination, taking peaceful and scientific programs out of context."

—Adam Kelliher, "The government dismissed...," UPI, 21 March 1988; in Lexis-Nexis Academic Universe, 21 March 1988, <http://web.lexis-nexis.com>.

11 April 1988

Prime Minister Rajiv Gandhi reaffirms India's adherence to a policy of disarmament. He also stresses that "India was not manufacturing nuclear weapons and did not have such a program, despite the fact that the program of the neighboring country put serious pressure on India."

—"Rajiv Gandhi Interview," ITAR-TASS (Moscow), 11 April 1988; in Lexis-Nexis Academic Universe, 11 April 1988, <http://web.lexis-nexis.com>.

21 April 1988

The Norwegian newspaper *Verdens Gang* reports that in 1983, 15 tons of Norwegian heavy water was illegally diverted to India while being shipped from Norway to West Germany. The paper alleges that the heavy water was used for the start up of the Kalpakkam nuclear power plant. Under Norwegian law, heavy water cannot be sold to India because it is not a signatory to the nuclear Non-Proliferation Treaty (NPT). An official from India's Ministry of Science Technology, while refusing to divulge where India obtained heavy water for the Kalpakkam facility, admits that in the past India has imported heavy water from the Soviet Union to make up for domestic shortfalls in production.

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—Dilip Ganguly, "India Needed Heavy Water at Time Norwegian Consignment Vanished," Associated Press, 6 May 1988; in Lexis-Nexis Academic Universe, 6 May 1988, <http://web.lexis-nexis.com>.

23 April 1988

US defense department officials allege that "India went to more advanced fissile materials 18 months ago and it is producing a great many weapons." US intelligence sources also claim that India has approached the French subsidiary of the Swiss firm Solger Brothers Ltd. to purchase tritium extraction technology. Tritium is used to boost the power of nuclear warheads, and according to one Pentagon official, "India has a warhead it can boost to 200kt." However, a State Department official claims that he is not aware of any Indian attempt to obtain tritium. He also downplayed an earlier UPI report which cited US intelligence and defense officials as claiming that India possessed approximately 20 air-deliverable nuclear bombs. The State Department official says, "I know of no one in the intelligence community who is saying (anything) like that," and cautions against "confusing the stockpiling of nuclear materials" with "the manufacture of nuclear weapons." However, he admits that the State Department does not deal with "raw intelligence data."

—Richard Sale, "India said to be Building 20 Nuclear Weapons a Year," UPI, 23 April 1988; in Lexis-Nexis Academic Universe, 23 April 1988, <http://web.lexis-nexis.com>.

27 April 1988

Indian Minister of State for Defense Production Shivraj Patil tells parliament that India "is considering the purchase of two light water atomic reactors from the Soviet Union." He says the two reactors will add an additional 2,000MW to India's nuclear generating capacity. According to a Soviet source, the technical and safeguard aspects of the reactors have been finalized. However, the financial details need to be sorted out.

—"India to buy Two Soviet Reactors," Xinhua (Beijing), 27 April 1988; in Lexis-Nexis Academic Universe, 27 April 1988, <http://web.lexis-nexis.com>.

28 April 1988

India's Minister of State for External Affairs Natwar Singh says, "India's apprehensions on Pakistan's nuclear weapons program had been confirmed by all available evidence."

—"India's Apprehensions about Pakistan's Nuclear Weapons 'Confirmed,'" British Broadcasting Corporation, 29 April 1988; in Lexis-Nexis Academic Universe, 29 April 1988, <http://web.lexis-nexis.com>.

5 May 1998

A report released by the Comptroller and Auditor General of India shows that India's most successful heavy water plant at Tuticorin only averaged one-fifth of its production capacity since it was commissioned in 1978. The highest production level achieved was 42.7 percent of its capacity, while its eight year average was 20.6 percent. This loss of production capacity resulted in financial losses of 1.24 billion rupees (\$94 million). Originally in 1971, the cost estimate of indigenously produced heavy water was 500-rupees per kilogram; but it has risen to 13,800 rupees per kilogram. "Coupled with low production, it (repairs and modifications) has changed the economic profile of the plants," says the report. The Tuticorin heavy water facility was built in collaboration with the French consortium M-S Gelpa; it produces sixty percent of India's indigenous heavy water.

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—Sheila Tefft, "Government Report Criticizes Tuticorin heavy Water Plant," *Nucleonics Week*, 5 May 1988, pp. 1, 10.

9 June 1988

Prime Minister Rajiv Gandhi tells CNN, "We've [India] had the means for almost 14 years now" to make nuclear weapons, "but we'll do our best not do so." Gandhi adds, "It is difficult to say what sort of pressure we would come under in case Pakistan did build a [nuclear] weapon." When asked about Pakistan's nuclear program, Gandhi states, "It's very obvious that they [Pakistan] have a nuclear weapons program. They have a program which is based on well-smuggled or stolen technologies. And it's now pretty obvious to the whole world where these technologies are being stolen from. And we're sad that those countries who can control them, put some pressure on them to stop this program, are not doing so."

—Gene Kramer, "Gandhi Says India will 'Do Our Best' Not to Build Nuclear Weapons," Associated Press, 9 June 1988; in Lexis-Nexis Academic Universe, 9 June 1988, <http://web.lexis-nexis.com>.

9 June 1988

In speech before the United Nations Special Session on Disarmament, Indian Prime Minister Rajiv Gandhi equates the doctrine of nuclear deterrence as "the ultimate expression of the philosophy of terrorism." He further blames the international system of "major powers rivalries" as being responsible for smaller countries feeling the need to acquire nuclear arms. On defending India's position on not signing the Non-Proliferation Treaty (NPT), Gandhi states, "Nor is it acceptable that those who possess nuclear weapons are freed of all controls while those without nuclear weapons are policed against their production."

—"Gandhi Likens Nuclear Deterrence to Terrorism," Kyodo News Service (Tokyo), 10 June 1988; in Lexis-Nexis Academic Universe, 10 June 1988, <http://web.lexis-nexis.com>.

13 June 1988

Pakistani Ambassador Shah Nawaz says Pakistan is willing to sign a bilateral nuclear test ban treaty with New Delhi, as well as issue a joint statement with India renouncing nuclear weapons. Nawaz also says Pakistan is ready to enter into a series of agreements with India including "simultaneous accession to the Non-Proliferation Treaty," "simultaneous acceptance of full-scope safeguards to nuclear programs," and "a bilateral agreement for mutual inspection of each other's nuclear facilities." With regards to defense spending, Pakistan appeals to India to accept Pakistan's proposal for a bilateral agreement "to limit arms and reduce military budgets."

—"Pakistan Urges Bilateral Nuclear Free Accords with India," Xinhua (Beijing), 13 June 1988; in Lexis-Nexis Academic Universe, 13 June 1988, <http://web.lexis-nexis.com>.

15 June 1988

Indian government sources tell the Press Trust of India that New Delhi will award contracts for two 1,000MW nuclear power stations to the Soviet Union despite opposition from India's Atomic Energy Commission (AEC). The decision by the Gandhi government follows considerable pressure from Moscow, which "is reflected in the fact the original Soviet offer was for one 500MW nuclear power station." The nuclear facilities will probably be located at Tirunelveli, and will become operational in five or six years. Soviet leader Mikhail Gorbachev is expected to travel to India in November 1988 year to sign the agreement.

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—"India to Build Nuclear Power Station with Soviet Assistance," Xinhua (Beijing), 15 June 1988; in Lexis-Nexis Academic Universe, 15 June 1988, <http://web.lexis-nexis.com>; K.K. Sharma, "India Power Orders for Moscow," *Financial Times* (London), 14 June 1998; in Lexis-Nexis Academic Universe, 14 June 1988, <http://web.lexis-nexis.com>.

24 July 1988

In reference to newspaper reports alleging that India may have received heavy water illegally in the early 1980s, M.R. Srinivasan, Chairman of India's Atomic Energy Commission (AEC), denies that India has illegally imported heavy water for its nuclear plants. Srinivasan says, "There is no question of importing illegally. In fact, at one stage we had exported (heavy water) to Belgium." India currently has six heavy water plants and two more under construction. Two of India's three nuclear power plants require the use of heavy water.

—"India Atomic Energy Chairman Denies Diversion of Heavy Water," Associated Press, 24 July 1988; in Lexis-Nexis Academic Universe, 24 July 1988, <http://web.lexis-nexis.com>.

4 August 1988

Indian Minister of State for Science and Technology, K.R. Narayanan, reports that "details" have been finalized with the Soviet Union concerning the construction of a nuclear power station by the year 2000. The project consists of two 1,000MW pressurized water reactors which use enriched uranium as fuel. However, the agreement has not been signed.

—"Indo-Soviet Tie-up in Nuclear Power Station," Xinhua (Beijing), 4 August 1988, in Lexis-Nexis Academic Universe, 4 August 1988, <http://web.lexis-nexis.com>.

6 August 1988

Speaking at a seminar on "Recent Trends in Pakistan and Its Nuclear Program," Indian Minister of State for External Affairs K.K. Tewari says, "We are clear in our mind that Pakistan is fully capable of manufacturing a nuclear bomb - this is a definite threat to our security." He concludes, if Pakistan crosses the nuclear threshold, it "would completely change ... (India's) security environment and force us to review our options."

—"Indian Minister Accuses Pakistan for Its Nuclear Program," Xinhua (Beijing), 6 August 1988; in Lexis-Nexis Academic Universe, 6 August 1988, <http://web.lexis-nexis.com>.

27 September 1988

India signs an agreement with the International Atomic Energy Association (IAEA) placing the two proposed 1,000MW nuclear reactors from the Soviet Union under international safeguards.

—"India's Agreement with IAEA Clears Way for Soviet Reactor Sale," Xinhua (Beijing), 28 October 1988; in Lexis-Nexis Academic Universe, 28 October 1988, <http://web.lexis-nexis.com>.

2 November 1988

Norwegian Trade Minister Jan Balstad confirms that 15 tons of Norwegian heavy water was smuggled to India five years ago. Balstad states, "The (Norwegian) government strongly regrets that Norwegian heavy water seems to have ended up in a country which is not party to the nuclear Non-Proliferation Treaty." Balstad says that Norway will ask for India's cooperation in the investigation of the shipment (1983) of heavy water that was sold by the

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Norwegian company Norsk Hydro to the West German firm of Rohstoff-Einfuhr. The Norwegian State Prosecutors office shows that the West German firm of Rohstoff-Einfuhr "handled the Norwegian consignment along with a smaller Soviet consignment of heavy water." The Indian Atomic Energy Commission (AEC) Secretary, S. Rajgopal denies India had "secretly imported heavy water from Norway but admit(s) that small quantities were imported from the Soviet Union."

—"Norway Claims Heavy Water Diverted to India," UPI, 2 November 1988; in Lexis-Nexis Academic Universe, 2 November 1988, <http://web.lexis-nexis.com>.

20 November 1988

Soviet President Mikhail Gorbachev and Indian Prime Minister Rajiv Gandhi issue a joint statement calling for the immediate banning of nuclear weapons testing to prevent an arms race in strategic nuclear weapons. Before his departure, Gorbachev and Gandhi also sign the final agreement under which the Soviet Union will sell two 1,000MW VVER light water nuclear power stations to India. The reactors will operate under international safeguards. The Indian foreign minister remarks, "This is an important landmark in the history of cooperation between the two countries. The USSR will supply enriched uranium fuel for the entire operational life of the nuclear power station. The agreement provides for maintenance by India of a mutually agreed minimum quantity of nuclear fuel and control assemblies. The agreement also provides for return of spent fuel."

—"India, Soviet Union Issue Joint Statement," Xinhua (Beijing), 20 November 1988; in Lexis-Nexis Academic Universe, 20 November 1988, <http://web.lexis-nexis.com>; T.S.K. Lingam, "Soviet Leader Mikhail Gorbachev...", UPI, 20 November 1988; in Lexis-Nexis Academic Universe, 20 November 1988, <http://web.lexis-nexis.com>; Neel Patri, "Gorbachev, Gandhi Sign Pact to Finance VVER-1000s in India," *Nucleonics Week*, 24 November 1988, p. 3.

December 1988

Rajiv Gandhi travels for a state visit to China, the first since Prime Minister Jawaharlal Nehru visited China in the 1950s. During Gandhi's visit, India and China agree that "peace and tranquility" should be maintained on the border as both sides negotiate to resolve the dispute through consultations and dialogues.

—George Perkovich, "The Nuclear Threat Grows Amid Political Uncertainty," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 298-299.

31 December 1988

During the fourth South Asian Association for Regional Cooperation (SAARC) summit, Indian Prime Minister Rajiv Gandhi and Pakistani Prime Minister Bhutto sign a bilateral agreement not to attack each other's nuclear facilities. Bhutto says, "A momentum for peace has begun. I think that in both of our countries there is a groundswell for peace. An extremely important step has been taken toward improving relations between India and Pakistan." Gandhi says he hopes this agreement "will help normalize things to come." The agreement states that both sides shall refrain from directly attacking, encouraging, or participating in any action aimed at destroying or damaging any nuclear facility. These facilities include nuclear power and research reactors and fuel fabrication, uranium enrichment, isotope separation and reprocessing facilities, as well as any other facilities containing radioactive material.

—Earleen Fisher, "Pakistan, India Agree Not to Attack Nuclear Plants," Associated Press, 31 December 1988; in Lexis-Nexis Academic Universe, 31 December 1988, <http://web.lexis-nexis.com>; "Pakistan, India Sign 3 Agreements

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after Talks," Xinhua (Beijing), 31 December 1988; in Lexis-Nexis Academic Universe, 31 December 1988, <http://web.lexis-nexis.com>; Shahid Ur-Rehman, "India and Pakistan Pledge No Harm to Nuclear Facilities," *Nucleonics Week*, 5 January 1989, pp. 8-9.

1988

Scientists at the Defense Research and Development Organization (DRDO) and the Bhabha Atomic Research Center (BARC) continue to refine nuclear weapon designs, by reducing the size and weight of the fission devices while increasing their explosive yield; they also continue work on boosted-fission and thermonuclear designs. Prominent scientists include, V.S. Arunachalam, P.K. Iyengar, K. Santhanam, Virender Sethi, and A.P.J. Abdul Kalam. Between 1988-1990, India reportedly builds approximately two dozen devices for quick assembly and dispersal to airbases for possible retaliatory attacks against Pakistan. All major steps ranging from preparations for the quick assembly of devices, to the movement of weapon components to different parts of the country, are authorized by Prime Minister Rajiv Gandhi. According to one former Indian official involved in the program, "we were carrying out experiments without deadlines or any commitment that the technologies would be integrated into actual weapons or a full-fledged weapons program. There was no weapon program as such."

—George Perkovich, "The Nuclear Threat Grows Amid Political Uncertainty," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 293-295.

Post-1988

In the absence of direction from India's political and civilian bureaucratic leadership, a group of Air Force officers led by Chief of Air Staff Air Marshall Mehra conducts an internal study on how best to employ aircraft and ballistic missiles for nuclear delivery. The group concludes that India's nuclear capable aircraft and ballistic missiles should be consolidated under a Strategic Air Command, which would develop a doctrine and operational plans for the employment of nuclear weapons. The command is established at the Air Force's Central Command in Central India, far away from Pakistan.

—George Perkovich, "The Nuclear Threat Grows Amid Political Uncertainty," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 296-297.

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1987

1987

The Soviet Union reportedly offers India technology transfer for a two nuclear reactor, two screw nuclear submarine design; the offer is accepted by India's Minister of State for Defense Arun Singh in principle. However, the Indian Navy (IN) opposes the new offer on grounds that changes in the submarine's design at this stage would lead to greater program delays and cost-overruns. Prime Minister Rajiv Gandhi overrules Singh and sticks with the original one reactor, one screw design. However, there is some concern in the IN that the original Soviet blueprint of an 85MW single reactor might translate into 40MW of outputted power, which would make the Indian nuclear submarine under-powered. The Soviet technology transfer mainly involves information on a pressurized heavy

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water reactor and a titanium double hull design to resist pressures up to a depth of 1,000-meters.

—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), pp. 651-652, 656.

9 January 1987

Jili Press reports that Toshiba Corporation will send a "Tokamak" nuclear reactor to India's Saha Institute of Nuclear Physics. Toshiba says the reactor is for experimental use only.

—"Toshiba to Ship Nuclear Fusion Reactor to India," Jili Press (Tokyo), 9 January 1987; in Lexis-Nexis Academic Universe, 9 January 1987, <http://web.lexis-nexis.com>.

Early or Mid-January 1987

India's Ambassador to Pakistan S.K. Singh is summoned to the Pakistani foreign office. Singh is allegedly told by Pakistan's foreign minister Zain Noorani that he has been authorized to convey the message that if India takes any action not conducive to the sovereignty and territorial integrity of Pakistan, Islamabad will consider inflicting "unacceptable damage on India." Noorani further warns that Pakistan's actions will not be restricted to northern India, but include targets beyond. In response to Singh's query whether the message implies threats to Bombay, Noorani replies, "it might be so."

—"The Nuclear Backdrop," *From Surprise to Reckoning: The Kargil Review Committee Report* (New Delhi: Sage Publications, 15 December 1999), p. 191.

Early to Mid-January 1987

Pakistan redeploys its Army Reserve South (ARS) and Army Reserve North (ARN) in a manner that establishes the potential for Pakistan to undertake a pincer movement to capture a salient in Indian Punjab and disrupt Indian communications with the state of Jammu & Kashmir.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 32.

Mid-January 1987

Prime Minister Rajiv Gandhi and senior government officials debate launching a pre-emptive conventional attack on Pakistan's Army Reserve South, a move that would also neutralize Pakistan's nuclear weapons related facilities. However, the prime minister ultimately favors a negotiated end to the standoff.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 280.

18-20 January 1987

India's Chief of Army Staff General K. Sundarji expresses concern at Pakistani military deployments in a press briefing. Sundarji's concerns are repeated by Prime Minister Rajiv Gandhi at a press conference on 20 January.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), pp. 33-34.

19 January 1987

The Indian Army authorizes movement of troops into forward defensive positions along the western border.

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—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 34.

23 January 1987

The Pakistani foreign ministry proposes talks with India to end the military standoff between the two countries. An Indian foreign ministry spokesperson seconds the proposal. On 25 January, both countries agree to negotiations stating that their military deployments are precautionary and defensive.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 34.

25 January 1987

India agrees to Pakistan's proposals to hold talks to defuse the Brasstacks crisis.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 35.

25 January 1987

Prime Minister Rajiv Gandhi bypasses the Department of Atomic Energy (DAE) and establishes a committee to study the feasibility of a Soviet offer to build 440MW nuclear reactors. M.G.K. Menon, head of the committee says, "I'm studying several proposals including the Soviet offer, which was made long ago." The deal may include "some sharing of nuclear fuel technology, which one scientific source said could include atomic vapor laser isotope separation technology," *Nucleonics Week* reports. The Soviet offer also includes attractive credit terms. The DAE does not support the purchase of Soviet reactors because it would make India more dependent on foreign supplies of enriched uranium, and it would require international safeguards.

—"India: Gandhi said Considering Soviet Reactor Offer," *Nucleonics Week*, 29 January 1987, p. 13.

28 January 1987

Indian journalist Kuldip Nayar meets Pakistani nuclear scientist Dr. A. Q. Khan in Islamabad. During the meeting, Khan informs Nayar that Pakistan has succeeded in enriching uranium to weapons-grade, and can build nuclear weapons. Khan adds, "...nobody can undo Pakistan or take us for granted. We are here to stay and let it be clear that we shall use the bomb if our existence is threatened."

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 39.

31 January 1987

Indian and Pakistani delegations begin negotiations in New Delhi to end the military standoff.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 36.

4 February 1987

Indian and Pakistani negotiators announce that they have reached an agreement for sector-by-sector withdrawal of troops from the border.

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—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 36 .

9 February 1987

The head of the Indian Nuclear Power Board, Dr. M.R. Srinivasan, is appointed Chairman of India's Atomic Energy Commission (AEC); Srinivasan replaces Dr. Raja Ramanna. Srinivasan will also serve as secretary of the Department of Atomic Energy (DAE).

—"New Head of Atomic Energy Commission," Press Trust of India, 11 February 1987; in Lexis-Nexis Academic Universe, 11 February 1987, <http://web.lexis-nexis.com>.

Spring 1987

The Indian military launches a major exercise along the Chinese border in North East India. The exercise is dubbed Operation Chequerboard. The exercise is mounted to test Indian military responses in the Northeast Himalayan region and possibly the US and Soviet reaction to potential Sino-Indian tensions in the region. The military exercise coincides with statements from India's Chief of Army Staff General K. Sundarji that India recognizes that it has major boundary differences with China and Indian deployments are intended to give Beijing the benefit of the doubt.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 289.

1 March 1987

Kuldip Nayar publishes Khan's interview in the London-based *Observer*.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 39.

3 March 1987

In response to the British *Observer* interview with the Pakistani nuclear scientists Dr. A.Q. Khan, in which he states Pakistan had developed a nuclear bomb, Indian Prime Minister Rajiv Gandhi orders the Ministries for External Affairs and Defense to provide more detailed information on Pakistan's nuclear status. Gandhi also states that Pakistan's "clandestine" non-peaceful nuclear program has gathered momentum in the last few years, and is "among the serious issues hampering normalization of relations" between India and Pakistan.

—"Rajiv Gandhi on Pakistan's Nuclear Program," Xinhua (Beijing), 3 March 1985; in Lexis-Nexis Academic Universe, 11 February 1987, <http://web.lexis-nexis.com>; John Elliott, "Gandhi Hits at US over Pakistan 'Bomb'," *Financial Times* (London), 4 March 1987, p. 3; in Lexis-Nexis Academic Universe, 4 March 1987, <http://web.lexis-nexis.com>.

5 March 1987

Indian Minister of State for Science and Technology, K.R. Narayanan announces to the Rajya Sabha (upper house of parliament) that the Soviet Union "has offered to assist India in the construction of a nuclear power plant." However, it is reported that India is reluctant to accept any Soviet offer, especially in light of the Chernobyl nuclear disaster.

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—"Soviet Offer to Build Nuclear Power Plant in India Confirmed," Xinhua (Beijing), 5 March 1987; in Lexis-Nexis Academic Universe, 5 March 1987, <http://web.lexis-nexis.com>.

12 March 1987

India announces it will increase its nuclear budget to USD 510 million for the fiscal year 1987-88; this represents a \$50 million increase from the previous year. The additional funds are primarily directed towards heavy water projects at Manuguru and Hazira and the synthesis gas plant at Nangal. A sum of \$76 million is earmarked for fuel reprocessing and other projects at the Bhabha Atomic Research Center (BARC).

—"India: India Increases Nuclear Budget \$50 million," *Nucleonic Week*, 12 March 1987, p. 16.

14 March 1987

The Indian government claims that there is nothing new in Dr. A.Q. Khan's public disclosures about Pakistan's nuclear weapon capabilities, and India has no intentions of manufacturing nuclear weapons.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 282.

2 April 1987

Prime Minister Rajiv Gandhi tells US reporters that any nuclear bomb manufactured by Pakistan would be "an Islamic bomb...which is funded by the Arabs and will be made available to Arabs."

—"Pakistan Raps Gandhi's A-bomb Comment," UPI, 2 April 1987; in Lexis-Nexis Academic Universe, 2 April 1987, <http://web.lexis-nexis.com>.

15 April 1987

Indian Minister of State for Science and Technology K.R. Narayanan tells parliament that India has received an offer from France to construct a nuclear power plant. Earlier, the Soviet Union offered to help build a nuclear power plant; but the offer was turned down because "Soviet reactors are not technically reliable."

—"France Offers to Set up Nuclear Power Plant in India," Xinhua (Beijing), 15 April 1987; in Lexis-Nexis Academic Universe, 15 April 1987, <http://web.lexis-nexis.com>.

23 April 1987

India's Atomic Energy Commission (AEC) Chairman Dr. M.R. Srinivasan says India's nuclear generating capacity will be raised from the present 1,000MW to 10,000MW by the year 2000. Under the larger nuclear program, the 235MW Narora unit will be commissioned by 1988-89, and the 235MW 2x Kakrapara units in western state of Gujarat in 1990. The 235MW 2x third and fourth units in northwest Rajasthan state will be expanded by 1994-95. Priority for nuclear development will be given to the resource scarce southern and northwestern parts of India.

—"Nuclear Capacity to be Increase tenfold," Press Trust of India, 23 April 1987; in Lexis-Nexis Academic Universe, 13 May 1987, <http://web.lexis-nexis.com>.

27 April 1987

During a debate on the defense budget in parliament, Indian defense minister K.C. Pant says Pakistan's intent to manufacture an atomic bomb might also lead India to build an atomic bomb. Pant states, "The emerging nuclear threat to us from Pakistan is forcing us to review our options. I assure the House that our response will be

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adequate to our perception of the threat."

—"India Reviews Nuclear Option," Xinhua (Beijing), 27 April 1987; in Lexis-Nexis Academic Universe, 27 April 1987, <http://web.lexis-nexis.com>; "Official Warns India May Build Bomb," UPI, 27 April 1987; in Lexis-Nexis Academic Universe, 27 April 1987, <http://web.lexis-nexis.com>.

January 1987-May 1987

In view of tensions, India and China steadily build up troops along the border. By May, both sides are estimated to have deployed nearly 200,000 troops each. The local Indian military commanders reportedly query the government as to India's response in the event China were to use nuclear weapons. The government tells military leaders that they will be informed of India's response when such an eventuality arises.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 289.

8 May 1987

K.R. Narayanan, Minister of State for Science and Technology, reports that India is "seriously considering an offer from the Soviet Union to set up a nuclear reactor in the country." Narayanan also confirms India is receiving enriched uranium for the Tarapur Nuclear Power Plant from France.

—"India Considers Soviet Nuclear Power Plant Offer," Xinhua (Beijing), 8 May 1987; in Lexis-Nexis Academic Universe, 8 May 1987, <http://web.lexis-nexis.com>.

14 May 1987

A publication by India's nuclear power board characterizes the country's nuclear power stations as "inherently safe." The publication also compares India's use of heavy water as a moderator and a coolant with the Soviet Chernobyl-type reactors that use graphite as a moderator; the former is regarded as more safe.

—"Indian N-Reactors Claimed Safe," Xinhua (Beijing), 14 May 1987; in Lexis-Nexis Academic Universe, 14 May 1987, <http://web.lexis-nexis.com>.

18 June 1987

While addressing the South Asian Association for Regional Cooperation (SAARC) foreign minister's meeting, Pakistani foreign minister Yaqub Khan calls for a dialogue on regional arrangements for nuclear non-proliferation in South Asia. He adds that Pakistan is ready to join any regional arrangement.

—"Pakistan Calls for Dialogue on Nuclear Non-proliferation in South Asia," Xinhua (Beijing), 18 June 1987; in Lexis-Nexis Academic Universe, 18 June 1987, <http://web.lexis-nexis.com>.

29 June 1987

On the insistence of Indian Prime Minister Rajiv Gandhi, a committee consisting of India's top nuclear scientists prepares a negotiation paper for accepting Soviet aid on constructing Soviet-made nuclear power plants. For India to accept the offer, the paper outlines a firm non-negotiable commitment from the Soviet Union on a long-term supply of nuclear fuel for the proposed plants.

—"India to Negotiate with Moscow on Nuclear Power Plants, Says India Newspaper," Xinhua (Beijing), 29 June 1987; in Lexis-Nexis Academic Universe, 29 June 1987, <http://web.lexis-nexis.com>.

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8 July 1987

During a press conference in Japan, Pakistani Prime Minister Mohammad Khan Junejo offers to allow India to inspect the Kahuta uranium enrichment plant near Rawalpindi in exchange for reciprocal inspections by Pakistan of an Indian nuclear facility.

—"Kyodo Interviews Junejo: Offer to India on Nuclear Inspections," Kyodo News Service (Tokyo), 8 July 1987; in Lexis-Nexis Academic Universe, 8 July 1987, <http://web.lexis-nexis.com>.

23 July 1987

The head of India's Department of Atomic Energy (DAE), M. Srinivasan, says India is not constructing a uranium enrichment industrial plant, though scientists are currently researching uranium enrichment on a laboratory scale at the Bhabha Atomic Research Center (BARC). He adds the alleged uranium enrichment facility in southern India is a plant associated with rare earth processing. Srinivasan also notes that repairs at the Talcher heavy water facility have been completed, although problems at the adjoining fertilizer plant has hampered heavy water production.

—Vyvyan Tenorio, "India is Not Building an Enrichment Plant," *Nucleonics Week*, 23 July 1987, p. 13.

August 1987

India and China begin to pull back troops from the border area.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 289.

3 August 1987

Indian Minister of State for Atomic Energy K. R. Narayanan tells parliament the Rajiv Gandhi government will establish a nuclear power corporation "to implement its commitment of generating 10,000MW of nuclear energy by the turn of the century." The new nuclear power corporation will be responsible for allocating scarce resources and oversee the designing and operational set-up of all nuclear power plants. It will also be responsible for raising funds on the open market.

—"India to Set Up Nuclear Power Corporation," Xinhua (Beijing), 3 August 1987; in Lexis-Nexis Academic Universe, 3 August 1987, <http://web.lexis-nexis.com>.

6 August 1987

Indian Minister of State for Atomic Energy K.R. Narayanan confirms that a delegation from the Soviet Union has discussed plans for setting up pressurized light water nuclear power plants with the Indian Atomic Energy Commission (AEC). Narayanan adds that, "discussions are continuing on technical, economic, and other aspects of the offer."

—"India, Soviet Union Discuss Establishment of Nuclear Power Plants in India," Xinhua (Beijing), 6 August 1987; in Lexis-Nexis Academic Universe, 6 August 1987, <http://web.lexis-nexis.com>.

6 August 1987

India's Atomic Energy Commission (AEC) Chairman M.R. Srinivasan categorically denies having said that India has a "comprehensive" nuclear weapons program. An official press release explains that he actually said India has a nuclear energy capability, which has "always been directed towards peaceful application."

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—"Energy Chief Denies India has Atom Bomb Program," Press Trust of India, 6 August 1987; in Lexis-Nexis Academic Universe, 8 August 1987, <http://web.lexis-nexis.com>.

7 August 1987

Indian Minister of State for External Affairs K. Natwar Singh tells parliament that Pakistan's proposal for mutual inspection of each other's nuclear facilities is "neither practicable nor workable."

—"India Rejects Pakistani Proposal for Mutual Inspection of Nuclear Facilities," Press Trust of India, 7 August 1987; in Lexis-Nexis Academic Universe, 10 August 1987, <http://web.lexis-nexis.com>.

9 August 1987

Unit 1 of the Rajasthan Atomic Power Station (RAPS-1) is derated to 100MW, or just less than 50 percent is its total generating capacity. The unit was shut down in 1985 because of recurrent leakage in its end-shield. Secretary to the Atomic Energy Commission (AEC) says, "We want to observe the performance and take a look at the end-shield for any light water leaks over a regular period."

—"India: Rapp-1 Taken to Half Power," *Nucleonics Week*, 10 September 1987, p. 3.

13 August 1987

K.R. Narayanan, minister of State for Science and Technology, informs parliament that India's known uranium reserves are adequate to support an installed capacity of 10,000MW. Also, he says the amount of thorium reserves (a new source of nuclear fuel made in India) will provide an "inexhaustible source of power" when fully developed.

—"India has Adequate Nuclear Fuel Reserves, Says Minister," Xinhua (Beijing), 13 August 1987; in Lexis-Nexis Academic Universe, 13 August 1987, <http://web.lexis-nexis.com>.

20 August 1987

Gary Milhollin, a law professor at the University of Wisconsin, publishes an article in the *American Journal of International Law* that argues India may develop nuclear weapons to counter a nuclear threat from Pakistan. "The Pakistan program has primarily been in response to the Indian program. They've gone all out since the 1974 test. If the Pakistanis go over the line and build nuclear weapons, then the Indians will be under enormous pressure to respond and will probably have to build their own weapons." Milhollin calls on the United States and other nuclear powers to intervene in South Asian to stop an arms race. He says, "It looks very bad for stopping the nuclear arms contest between those countries unless the nuclear supplier nations can get together." Milhollin also sees that India will have the ability to "export a number of nuclear items such as plutonium."

—Tim Ahern, "Report Says India is on Way to Developing Nuclear Weapons," Associated Press, 21 August 1987; in Lexis-Nexis Academic Universe, 21 August 1987, <http://web.lexis-nexis.com>.

20 August 1987

The Director of the Bhabha Atomic Research Center (BARC), Dr. P.K. Iyengar, says India will be able to export heavy water technology and nuclear power reactors in a few years. He adds BARC has the ability to make nuclear bombs, but denies reports of a secret bomb factory near Mysore in the southern state of Karnataka.

—"India will be able to Export Nuclear Reactors within a Few Years," Press Trust of India, 20 August 1987; in Lexis-Nexis Academic Universe, 22 August 1987, <http://web.lexis-nexis.com>.

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27 August 1987

Indian Minister for Science and Technology K.R. Narayanan tells parliament that India will import 2.3 billion rupees (\$177 million) worth of components and equipment for the four heavy water reactors that are currently under construction. Since India is not a member of the Non-Proliferation Treaty (NPT) and will not accept international safeguards on its nuclear facilities, it can only import non-sensitive nuclear components. Because India has placed a heavy emphasis on indigenous production of nuclear energy, some observers have expressed surprise on the amount of imported material needed for the 235MW plants.

—"India Importing Millions for PHWRs," *Nucleonics Week*, 10 September 1987, p. 13.

1 September 1987

Pakistan urges India to accept its proposal to declare South Asia a nuclear-weapon-free zone.

—"Pakistan Seeks Indian Cooperation in Reactor Building," Kyodo News Service (Tokyo), 1 September 1987; in Lexis-Nexis Academic Universe, 1 September 1987, <http://web.lexis-nexis.com>.

2 September 1987

Delegates to the conference on "Nuclear Disarmament in South Asia" push for India and Pakistan to improve bilateral relations. The Sri Lankan delegate adds, "The duty of India and Pakistan is to work for the prevention of nuclear war for the health and happiness of the people of South Asia."

—"India, Pakistan asked to Work for Peace and Stability in South Asia," Xinhua (Beijing), 2 September 1987; in Lexis-Nexis Academic Universe, 2 September 1987, <http://web.lexis-nexis.com>.

7 September 1987

India announces plans to establish a second nuclear fuel complex at the port of Visakhapatnam. Visakhapatnam is also a major Indian naval base. The current nuclear fuel complex (NFC) is located in Hyderabad. According to Department of Atomic Energy (DAE) estimates, India will need to increase its production of PHWR fuel by 600 percent to 1,500 metric tons per year, and the production of zircaloy needs to be raised five times to 250 tons per year in order for India to achieve 10,000MW generating capacity by the year 2000. The current installed capacity is 1,330MW. The DAE also intends to construct a new zirconium plant and a new uranium oxide fuel facility. Further, it will expand its existing zircaloy and fuel assembly plants.

—"India: India Plans Second Fuel Complex," *Nuclear Fuel*, 7 September 1987, p. 13.

10 September 1987

The 100MW Dhruva research reactor's current generating capacity is increased to 80MW. Until now, the research reactor had been operating at 60MW following the completion of its repairs that have been ongoing since 1985 at the Bhabha Atomic Research Center (BARC). In an interview with *Nucleonics Week*, Department of Energy (DAE) Chairman M. Srinivasan says many modifications were made to correct fuel vibrations and the fuel "has performed well." K.V.M. Rao, a senior Indian atomic energy official says, "The design was slightly modified in order to dampen the vibrations." Srinivasan also notes that the 40MW fast breeder test reactor (FBTR) at Kalpakkam is "being made ready to start with an enlarged core sometime in the near future." The FBTR has been operating on a smaller start-up core since 1985.

—"India: Dhruva Cleared for Power Ascension," *Nucleonics Week*, 10 September 1987, p. 13.

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21 September 1987

During an interview with India television, Indian Minister of State for External Affairs, Natwar Singh, says, "India's nuclear explorations have never been aimed at developing weapons and are being conducted in the interests of social and economic development, for the good of the Indian people."

—"Interview by Indian Foreign Minister," ITAR-TASS (Moscow), 21 September 1987; in Lexis-Nexis Academic Universe, 21 September 1987, <http://web.lexis-nexis.com>.

24 September 1987

In a speech to the United Nations General Assembly, Pakistani Prime Minister Mohammad Khan Junejo proposes that Pakistan and India jointly accept a nuclear-free zone and regional test ban treaty in South Asia. To achieve this end, Junejo recommends holding a United Nations conference on nuclear nonproliferation in South Asia. He says, "Pakistan is prepared to go further and subscribe to a comprehensive test ban in a global, regional, or bilateral context. The conclusion of a bilateral test ban agreement between Pakistan and India would serve to assure each other, and the world, that neither country has any intention of pursuing the nuclear weapons option." An India diplomat responds to Junejo's speech by stating, "The main thing is Pakistan must stop doing what the whole world knows it is doing - clandestinely developing nuclear weapons."

—"Pakistan Proposes Nuclear Test Ban in South Asia," *New York Times*, 25 September 1987, p. A9; in Lexis-Nexis Academic Universe, 25 September 1987, <http://web.lexis-nexis.com>.

9 October 1987

India and the United States sign two agreements that pave the way for the first ever US sale of supercomputers to a non-Western country and a nation that that close military and economic ties with the Soviet Union. Withdrawing its initial request for a more advanced supercomputer, the XMP-24, India is set to purchase the less sophisticated XMP-14. India says its needs the supercomputers to research weather patterns, especially the seasonal monsoon rainstorms.

—T.S.K. Lingam, "US Signs First Sale of Supercomputers to non-Western Nation," UPI, 9 October 1987, in Lexis-Nexis Academic Universe, 9 October 1987, <http://web.lexis-nexis.com>; Steve R. Weisman, "India and US Agree on Supercomputer Sale," *New York Times*, 9 October 1987, p. D1; in Lexis-Nexis Academic Universe, 9 October 1987, <http://web.lexis-nexis.com>.

11 October 1987

New Delhi applauds the recent action taken by the US Congress to suspend aid to Pakistan because of its nuclear program, but rejects the call by Washington for a test ban treaty between India and Pakistan. Indian Prime Minister Rajiv Gandhi adds, "We [India] feel it will not stop their nuclear program. We don't think, especially in the situation in Pakistan, that we will be able to achieve a freezing of their nuclear weapons program just by inspections." Gandhi believes such a treaty would give the Reagan administration an opportunity to "turn a blind eye to what they (Pakistan) are doing."

—Steven R. Weisman, "India Rejects Idea for Nuclear Ban," *New York Times*, 11 October 1987, p. A15; in Lexis-Nexis Academic Universe, 11 October 1987, <http://web.lexis-nexis.com>.

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16 October 1987

India's Nuclear Power Board is renamed the Nuclear Power Corporation, and will be responsible for the design, construction and operation of India's nuclear power plants.

—"Nuclear Power Corporation Set Up," New Delhi Home Service, 16 October 1987; in Lexis-Nexis Academic Universe, 28 October 1987, <http://web.lexis-nexis.com>.

20 October 1987

Prime Minister Rajiv Gandhi urges US officials to terminate economic and military aid to Islamabad in order to slow down Pakistan's nuclear weapons program. When asked whether Pakistan's nuclear weapons program would force India to go nuclear, Gandhi remarks, "we'll evaluate the situation when it comes...we feel the costs of going nuclear, not just the money cost, but all other costs, are much too heavy and we would like to do anything to prevent ourselves going nuclear."

—Cited in, George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 291.

21 October 1987

During a farewell lunch with Indian Prime Minister Rajiv Gandhi, United States President Ronald Reagan assures Gandhi that US aid to Pakistan is not directed towards India. Reagan also urges that "India and Pakistan intensify their dialogue to build mutual confidence, resolve outstanding issues and deal with the threat of nuclear proliferation in the region." In response, Gandhi replies, "We do not have nuclear weapons, we do not want nuclear weapons, and we certainly do not want nuclear weapons in our neighborhood. We have no intention of producing nuclear weapons unless constrained to do so."

—W. Dale Nelson, "Gandhi Says India Doesn't Want Nuclear Weapons," Associated Press, 21 October 1987; in Lexis-Nexis Academic Universe, 21 October 1987, <http://web.lexis-nexis.com>.

3 November 1987

At the third annual summit of the South Asian Association for Regional Co-operation (SAARC) in Nepal, Pakistan, Nepal, and Bhutan call on India to change its policy on the nuclear weapons test ban treaty. As of yet, India has refused to enter into a bilateral test ban treaty with Pakistan because it believes the treaty should include India's larger, established nuclear power, China.

—John Elliott, "India Urged by Neighbors to Change Nuclear Policy," *Financial Times* (London), 3 November 1987, p. 4; in Lexis-Nexis Academic Universe, 3 November 1987, <http://web.lexis-nexis.com>.

12 November 1987

Speaking before Rajya Sabha (India's upper house of parliament), Prime Minister Rajiv Gandhi says the nuclear programs of India and Pakistan should be treated differently because they have different aims. "While India conducted nuclear research for peaceful purposes and was prepared to open its nuclear facilities to inspection, the Pakistani program was directed at developing weapons." Gandhi adds that Pakistan's nuclear program was furthered by stealing nuclear technology from other countries, and other illegal methods.

—"Gandhi - Pakistan and Nuclear Bomb," ITAR-TASS (Moscow), 12 November 1987; in Lexis-Nexis Academic Universe, 12 November 1987, <http://web.lexis-nexis.com>.

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20 November 1987

India and China begin the eight round of talks on the boundary dispute. Although no breakthroughs are achieved, the talks end on a positive note.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 290.

26 November 1987

Admiral R.H. Tahiliani, Chief of Indian Naval Staff, says the Indian Navy may purchase nuclear propelled submarines from the Soviet Union. Negotiations with Soviet Union are under way, and the initial training of Indian naval personnel has been conducted.

—"India to buy Nuclear propelled Submarines from Soviet Union," Xinhua (Beijing), 26 November 1987; in Lexis-Nexis Academic Universe, 26 November 1987, <http://web.lexis-nexis.com>.

December 1988

Rajiv Gandhi travels for a state visit to China, the first since Prime Minister Jawaharlal Nehru visited China in the 1950s. During Gandhi's visit, India and China agree that "peace and tranquility" should be maintained on the border as both sides negotiate to resolve the dispute through consultations and dialogues.

—George Perkovich, "The Nuclear Threat Grows Amid Political Uncertainty," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 298-299.

3 December 1987

The *Washington Post* reports the US Senate Appropriations Committee has approved an amendment to the Foreign Assistance Act that will link US foreign aid to a country's position on producing weapons grade enriched uranium or separation of plutonium in unsafeguarded facilities. Indian defense analyst and diplomats see the Senate action as a way to justify continuing aid to Pakistan "despite Islamabad's apparent contravention of US laws aimed at preventing nuclear proliferation." An Indian diplomat says, "If a Senate committee feels it wants or needs to aid Pakistan, let it do so....It will only confirm to Pakistan that they can steal (nuclear technology) and the United States will just look the other way. That is the US business, but don't drag India into it." Pakistan is up for a \$4.02 billion aid package from the United States, whereas India receives \$50 million annually in US aid.

—Richard m. Weintraub, "US Military Tie at Risk, Indians Say; Move in Senate Seen Equating Pakistani, Indian Nuclear Programs," *Washington Post*, 3 December 1987, p. A32; in Lexis-Nexis Academic Universe, 4 December 1987, <http://web.lexis-nexis.com>.

14 December 1987

The Indian Navy acquires one Soviet nuclear powered submarine on lease. The submarine, named the *INS Chakra*, will arrive at Vishakhapatnam, a port in Andhra Pradesh, on 27 December. It is reported that the *INS Chakra* will carry conventional, not nuclear, weapons.

—"India Acquires Two Soviet Nuclear-Powered Submarines," Xinhua (Beijing), 14 December 1987; in Lexis-Nexis Academic Universe, 14 December 1987, <http://web.lexis-nexis.com>; John Elliott, "India May Purchase Soviet N-Sub," *Financial Times* (London), 15 December 1987, p. 4; in Lexis-Nexis Academic Universe, 15 December 1987, <http://web.lexis-nexis.com>.

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14 December 1987

Denying that India has bargained away its nuclear option, India's External Affairs Minister Natwar Singh tells parliament that India will not sign the Nuclear Non-Proliferation Treaty (NPT) "until the two superpowers take 'definite steps' to reduce their nuclear arsenals and limit the militarization of space." Singh adds that Pakistan is believed to be on the threshold of developing a deployable nuclear weapon, and China is already a nuclear power. Hence, the time is not right for India to contemplate signing the NPT.

—"India: Still Will Not Sign Nuclear Non-Proliferation Treaty," Inter Press Service, 14 December 1987; in Lexis-Nexis Academic Universe, 14 December 1987, <http://web.lexis-nexis.com>.

Late 1987

Indian nuclear weaponization efforts continue. Officials from the Defense Research and Development Organization (DRDO) and the Bhabha Atomic Research Center (BARC) inform the prime minister and selected top government officials that they can assemble nuclear warheads within weeks. However, Indian Air Force (IAF) officers entrusted with the task of air delivery are skeptical, as the IAF has still not modified aircraft or tested the requisite systems for air deliverable nuclear weapons. Nuclear scientists reportedly advise the prime minister that India continue weaponization efforts without launching an overt nuclearization program. Prime Minister Rajiv Gandhi subsequently sanctions funds to make the short-range Prithvi ballistic missiles nuclear capable as well as augment the existing aircraft-deliverable nuclear ordnance. The Scientific Advisor to the Indian government, V.S. Arunachalam, becomes the coordinator of the weaponization efforts.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 283; Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 355-356.

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1986**Early 1986**

The Indian Army begins planning a large military exercise-*Brasstacks*-along the western border with Pakistan to test its ability to conduct mobile armored warfare. The exercise is divided into four phases from May 1986 to March 1987.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 28.

16 January 1986

Nucleonics Week reports India has earmarked \$2.3 billion for the nuclear sector in the five year plan period ending in 1990. According to details of India's Seventh Five-Year Plan, \$1.2 billion is allocated for nuclear power projects and \$262.5 million is directed towards research and development projects. The plan foresees the commissioning of Unit 2 of the Madras Atomic Power Station (MAPS-2) and two 235MW units at Narora, the continuing of the two-

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unit Kakrapar facility and the beginning of four additional 235MW reactors. Funding for the next generation of India's 500MW nuclear generators "will be expedited," says the report. The Seventh Five-Year Plan also sees India's fast breeder reactor technology move out of the laboratory, and the setting up of new facilities for nuclear research, which will include a variable energy cyclotron and an electron accelerator, reports *Nucleonics Week*. The Department of Atomic Energy (DAE) is also creating an administration network to oversee all of India's nuclear power projects.

—"Briefly: India," *Nucleonics Week*, 16 January 1986, p. 17.

5 February 1986

Dr. C.V. Sundaram, Director of the Indira Gandhi Center for Atomic Research (IGCAR) at Kalpakkam says India will be capable of producing 10,000MW of nuclear energy by the year 2000.

—"Atomic Energy - Power and Breeding," New Delhi Home Service, 5 February 1986; in Lexis-Nexis Academic Universe, 19 February 1986, <http://web.lexis-nexis.com>.

4 March 1986

India's Minister of State for Defense Arun Singh recommends that India should consider abandoning its non-nuclear policy in the face of a nuclear threat from Pakistan.

—"India should consider....," UPI, 4 March 1986; in Lexis-Nexis Academic Universe, 4 March 1986, <http://web.lexis-nexis.com>.

8 April 1986

Answering questions in Parliament, Prime Minister Rajiv Gandhi says, "India does not have a nuclear weapons program and does not want to go ahead with a nuclear weapons program. India's nuclear program is entirely for peaceful purposes."

—"Indian Prime Minister on Nuclear Disarmament," Xinhua (Beijing), 8 April 1986; in Lexis-Nexis Academic Universe, 8 April 1986, <http://web.lexis-nexis.com>.

16 April 1986

Shivraj V. Patil, Indian Minister of State for Science and Technology, says India has become "self-reliant in nuclear technology." India now has the technology "for the construction of nuclear reactors and production of heavy water." It also has developed technology for the disposal of nuclear waste.

—"India Becomes Self-Reliant in Nuclear Technology," Xinhua (Beijing), 16 April 1986; in Lexis-Nexis Academic Universe, 16 April 1986, <http://web.lexis-nexis.com>.

29 April 1986

A fire causes heavy damage at the Talcher heavy water production facility. The fire is caused by "failure of one of the aluminum liners in the gasket used on the cover joint in one of the synthetic gas compressors," states K.S. Bhimbhat, Executive Director of Heavy Water Projects in the Department of Atomic Energy (DAE). The pipeline that channels synthetic gas from a fertilizer plant was immediately closed, and the remaining gas in the line was burnt down. The blaze was brought under control within an hour. Bhimbhat estimates that the plant will be shut down

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for approximately three months for repairs, previously scheduled modifications and annual maintenance.

—"Briefly: India," *Nucleonics Week*, 22 May 1986, pp. 15-16.

9 May 1986

The *Financial Times* reports that India attempted to purchase "two sophisticated industrial cameras in Britain." Western officials view the attempt by the Indian defense ministry to buy the cameras, known as flash discharge x-ray machines, from Hadland Photonics of Hemel Hempstead as indicating India has resumed its nuclear weapons program. According to the report, "the machines can take a series of pictures through metal at extremely short intervals and are typically used to inspect welds or calibrate guns. They are also used in designing nuclear weapons." The sale was blocked by the British government. It is reported that India has now approached the Swedish company Scandiflash of Uppsala.

—Simon Henderson, "Suspensions Aroused on Indian N-Weapons," *Financial Times* (London), 9 May 1986; in Lexis-Nexis Academic Universe, 9 May 1986, <http://web.lexis-nexis.com>.

9 June 1986

N. Srinivasan, a member of the Indian Atomic Energy Commission (AEC) and supervisor of India's heavy water production, tells reporters that India will soon be self-sufficient in the production of heavy water. Srinivasan says, "We now do in six years in this entire technology what once would take ten years. You may say that, given the resources, we have the expertise to design, construct and operate heavy water plants on our own."

—"India to be Self-sufficient in Heavy Water Production," Xinhua (Beijing), 9 June 1986; in Lexis-Nexis Academic Universe, 9 June 1986, <http://web.lexis-nexis.com>.

27 June 1986

According to an Indian government press release, about seven tons of heavy water escaped from the coolant system of the Madras Nuclear Power Plant (MAPP-1) on 25 June. The MAPP-1 was undergoing re-commissioning activities. The incident did not result in the release of any radioactivity into the surrounding environment.

—"Indian Nuclear Reactor's Incident," Xinhua (Beijing), 27 June 1986; in Lexis-Nexis Academic Universe, 27 June 1986, <http://web.lexis-nexis.com>.

26 July 1986

Speaking at the atomic research center in Kalpakkam, Indian Vice-President R. Venkataraman says India "would continue to tap nuclear power potential despite the accident at the Chernobyl Nuclear Power Plant in the Soviet Union." Currently, India has three nuclear power plants located in the states of Rajasthan, Maharashtra and Tamil Nadu, with a total power generating capacity of 1,273MW. India intends to reach a nuclear generated power capacity of 10,000MW by the year 2000.

—"Indian Vice-President on Nuclear Power Exploitation," Xinhua (Beijing), 26 July 1985; in Lexis-Nexis Academic Universe, 26 June 1986, <http://web.lexis-nexis.com>.

2 August 1986

India's parliament appeals to members of the six-nation (India, Mexico, Argentina, Tanzania, Greece and Sweden) summit to be held in Mexico next week. They urge summit members to "take further initiatives to give a call to try

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to halt this race to doom. Above all, we would request you to give a call for a complete nuclear test ban treaty and to keep outer space free from any kind of weapon." This six-nation meeting is a continuation of disarmament discussions which took place in New Delhi in January 1985.

—"Indian Parliamentarians Appeal for Halt to Arms Race," Xinhua (Beijing), 2 August 1986; in Lexis-Nexis Academic Universe, 2 August 1986, <http://web.lexis-nexis.com>.

8 August 1986

Dr. P.K. Iyengar, Director of the Bhabha Atomic Research Center, announces the research nuclear reactor Apsara will be the first nuclear reactor in India to be decommissioned. Built in 1956, Apsara, a 1MW pool reactor, was India's first research reactor and trained many of its top nuclear scientists.

—"India's Oldest Nuclear Reactor to be Decommissioned," Xinhua (Beijing), 8 August 1986; in Lexis-Nexis Academic Universe, 8 August 1986, <http://web.lexis-nexis.com>.

20 August 1986

India's Department of Atomic Energy (DAE) announces it will turn down the Soviet Union's offer to sell India two 440MW light water, enriched uranium reactors. In arriving at its decision, the DAE says accepting the offer would disrupt India's existing nuclear power program. India's reactors are based on heavy water natural uranium fueled reactors.

—"India Rejects Soviet Nuclear Reactors Offer," Xinhua (Beijing), 20 August 1986; in Lexis-Nexis Academic Universe, 8 August 1986, <http://web.lexis-nexis.com>.

28 August 1986

According to a Press Trust of India (PTI) report, the Department of Atomic Energy (DAE) is considering decommissioning Unit 1 of the Rajasthan Atomic Power Station (RAPS-1). RAPS-1 was originally shut down on 4 March 1982 after technicians discovered a leakage in the south end-shield. The unit was restarted in February 1985 after technicians attempted to seal the leak with the use of remote robots and chemicals. However, the unit was down again three months later when additional cracks appeared in other locations. Malur Srinivasan, Chairman of the Nuclear Power Board, says every conventional repair attempt has been tried "but we have found that it is not possible to solve the problem with existing technology." During an interview with *Nucleonics Weekly*, DAE Chairman Dr. Raja Ramanna says that a total replacement might be necessary. To replace an end-shield would be a major undertaking and involve robotic technologies that have yet to be developed. Nuclear experts believe any repair attempt would be too costly; therefore India's best alternative is to decommission the reactor. Furthermore, RAPS-1 would not be able to operate at its full 235MW capacity because seven of its fuel channels have been permanently plugged over that past few years in order to seal the leaks. Supplied by Canada, the end-shield is made of nickel carbon steel which became embrittled by radiation exposure. Srinivasan says other reactors will not encounter the same problems with their end-shield because India's other nuclear reactors use end-shields made of different material.

—Vyvyan Tenorio, "India's Department of Atomic Energy (SAE) Has Given up on Trying to Fix Raps-1's...", *Nucleonics Week*, 28 August 1986, pp. 12-13.

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28 August 1986

According to Dr. P.K. Iyengar, Director of the Bhabha Atomic Research Center (BARC), India's first research reactor, the Apsara, will soon be decommissioned. He say, "It will be dismantled and its radioactive parts will be safely stored." Uncontaminated components such as control equipment and pumps will be used to construct a new test reactor similar to Apsara. Originally built in 1956, the Apsara is a 1MW swimming pool reactor; it is the first reactor scheduled to be decommissioned in India.

—"Briefly: India," *Nucleonics Week*, 28 August 1986, p. 20.

29 August 1986

An Indian Embassy official denies allegations that India has "failed to account for heavy water used in making nuclear weapons." The allegations were made by Gary Milhollin, a former US Nuclear Regulatory Commission consultant. Now working for the US Natural Resources Defense Council, Milhollin reported in a study released last January that "India lacked sufficient heavy water," without illegal imports from China or diversion, to open the three new atomic reactors that went on line in 1985. Milhollin adds that these new reactors could produce nuclear material for up to 15 nuclear bombs annually. Responding to Milhollin's allegations, Subramaniam Jayhawker, Indian Embassy First Secretary, calls the study "utter nonsense." He adds a deal between China and India "is difficult to take seriously." Han-Friedrich Meyer, a spokesperson for the International Atomic Energy Association (IAEA), says no diversion has been found. "We have checked all the heavy water inventories of the heavy water under safeguard by the agency in India. No diversions have been detected. We checked it. So we know about it." —"India Got Weapons Capability with Chinese Help, Researcher Charges," Associated Press, 29 August 1986, in Lexis-Nexis Academic Universe, 29 August 1986, <http://web.lexis-nexis.com>; "India Denies Charges on Secret Building of Nuclear Arms, Xinhua (Beijing), 30 August 1986; in Lexis-Nexis Academic Universe, 30 August 1986, <http://web.lexis-nexis.com>.

4 September 1986

Unit 2 of the Madras Atomic Power Station (MAPS-2) is shut down because of a malfunctioning control valve and other minor repairs. However, the reactor is re-started shortly after the repairs are been completed.

—Notes Pertaining to the Generating Table for July: India's Mapp-2..., " *Nucleonics Week*, 4 September 1986, p. 15.

7 September 1986

The *Times of India* reports the commissioning of India's largest nuclear research reactor, Dhruva, has been postponed indefinitely. The postponement has been caused by a "major recurrence of the vibration problem which has been plaguing the reactor ever since [it achieved criticality] in August of last year."

—"Operation of India's Largest Reactor Putt Off," Xinhua (Beijing), 8 September 1986; in Lexis-Nexis Academic Universe, 8 September 1986, <http://web.lexis-nexis.com>.

11 September 1986

The *Statesman* reports the Bhabha Atomic Research Center (BARC) will soon commission India's first nuclear waste storage facility. The underground vault made of steel reinforced concrete is located a short distance from the Tarapur Atomic Power Station (TAPS), and will be the storage facility for the nuclear waste that has been accumulating in India since 1956.

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—"India's First Nuclear Waste Storage Facility to be Commissioned," Xinhua (Beijing), 11 September 1986; in Lexis-Nexis Academic Universe, 11 September 1986, <http://web.lexis-nexis.com>.

28 October 1986

India's Department of Atomic Energy (DAE) reports that the 100-metric ton capacity Thal Vaishet heavy water facility has begun production. Construction of the plant began in 1982 and completed initial testing on 15 October 1986. Feedstock for Thal Vaishet is synthesis ammonia gas from the adjoining state-owned fertilizer plant. Rashtriya Chemicals & Fertilizers Ltd, a public company, constructed and is currently operating both facilities.

Thal Vaishet is India's fifth heavy water production facility and was completed ahead of schedule. Another heavy water facility at Talcher was heavily damaged as a result of a fire earlier this year. The three other plants-Baroda, Tuticorin, and Kota—are operating at satisfactory levels. Although India has experienced numerous problems with its heavy water production facilities, New Delhi has decided not to purchase heavy water from international sources which would be subject to safeguards.

—"The Thal Vaishet Heavy Water Plant has Begun Production," *Nucleonics Week*, 27 November 1986, pp. 2-3.

Late 1986

The Indian parliament amends the constitution to grant statehood to the North East Frontier Agency (NEFA); the new state is called Arunachal Pradesh. Subsequent to the amendment, tensions between India and China mount as the state covers areas that both countries consider disputed territory.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 289.

2 November 1986

The US administration approves the sale of US-made supercomputers to India. The supercomputers are capable of performing a large number of complex calculations at a high rate. While India wants the computers to track monsoon weather patterns, the supercomputers also have a "vast number of military applications, including designing nuclear and conventional weapons, making and breaking codes, and figuring the aerodynamic properties of rockets and airplanes." There are concerns in Washington that India might use the supercomputers to aid its suspected nuclear weapons program, or India will allow the technology to leak to the Soviet Union.

—"US Permits Sale of Supercomputer to India," Xinhua (Beijing), 2 November 1986; in Lexis-Nexis Academic Universe, 2 November 1986, <http://web.lexis-nexis.com>.

4 November 1986

Dr. Raja Ramanna, chairman of India's Atomic Energy Commission, says India is capable of producing enriched uranium at any level of purity. He says, "If this country (India) requires enriched uranium, we can produce enriched uranium." Ramanna made his statement following a *Washington Post* report that Pakistan has made "dramatic progress towards developing a nuclear weapon."

—"India has Nuclear Weapons Capability," UPI, 4 November 1986; in Lexis-Nexis Academic Universe, 4 November 1986, <http://web.lexis-nexis.com>.

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Early November 1986

Pakistan's Army Reserve South (ARS) completes its planned exercise; but troops remain in their exercise area as a precautionary response to India's Brasstacks exercise.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 31.

27 November 1986

Indian Prime Minister Rajiv Gandhi and Soviet leader Mikhail Gorbachev issue a joint declaration for an international ban on the use of nuclear weapons aimed at establishing a "Nuclear Free and Non-violent World." The plan includes proposals for:

- Complete destruction of nuclear arsenals before the year 2000
- Barring of all weapons from outer space
- Banning of all nuclear weapons tests
- Prohibition of the development of new types of weapons of mass destruction
- Banning of chemical weapons and destruction of their stockpiles
- Reduction in the levels of conventional and armed forces

—"India, USSR issue Joint Declaration on Disarmament," Xinhua (Beijing), 27 November 1986; in Lexis-Nexis Academic Universe, 27 November 1986, <http://web.lexis-nexis.com>; Richard M. Weintraub, "Gorbachev, India Ask ban on Nuclear Arms Use; Disarmament, Soviet Aid at Center of Talks in Soviet Leader's Visit to New Delhi," *Washington Post*, 28 November 1986, p. A35; in Lexis-Nexis Academic Universe, 28 November 1986, <http://web.lexis-nexis.com>.

December 1986

Pakistan begins its own annual winter exercise along the border with India and deploys its Army Reserve North (ARN) in north Punjab as a hedge against provocative Indian deployments in the Rajasthan desert.

—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), p. 32.

8 December 1986

Members of India's parliament, cutting across party lines, appeal to Prime Minister Rajiv Gandhi's government to revise India's nuclear policy because of the reported increase in Pakistan nuclear capability.

—"India MPs call for 'Deterrent' Against Pakistan's Nuclear Capability," Press Trust of India, 8 December 1986; in Lexis-Nexis Academic Universe, 10 December 1986, <http://web.lexis-nexis.com>.

December 1986-January 1987

As part of Phase III of Brasstacks Exercise, India concentrates two armored divisions, one mechanized division, and six infantry divisions in the Rajasthan desert adjacent to Pakistan's Sindh province. Pakistani leaders and government officials are not informed about the scale and scope of the exercise, nor do Indian officials establish communication links during the exercise to reassure Pakistan of India's intent.

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—Kanti P. Bajpai et al., "India and the Initiation of a Crisis," *Brasstacks and Beyond: Perception and Management of Crisis in South Asia* (New Delhi: Manohar Publishers & Distributors, 1995), pp. 28-29.

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1985

10 January 1985

Following the example of India's prime ministers, Rajiv Gandhi retains the portfolios of atomic energy, high technology, and related industry.

—"Briefly: India," *Nucleonics Week*, 10 January 1985, p. 13.

18 January 1985

Prime Minister Rajiv Gandhi informs parliament that the 15 persons arrested for allegedly spying on India's nuclear program belonged to late Prime Minister Indira Gandhi's personal secretariat. Indira Gandhi held the nuclear program portfolio at the time. Among the arrested are P.C. Alexander, one of the six members of the Atomic Energy Commission (AEC) and formerly principal secretary to Ms. Gandhi. The spy ring was apparently created in 1982 at the behest of the French military attaché.

—"Briefly: India," *Nucleonics Week*, 7 February 1985, p. 11.

24 January 1985

According to Dr. Raja Ramanna, chairman of the Atomic Energy Commission (AEC), trial commissioning of India's fast breeder test reactor (FBTR) at Kalpakkam is proceeding well. Sources say full commissioning should take place in April 1985. India's FBTR is the world's first reactor to use mixed carbide fuel, "a combination of plutonium carbide and uranium carbide," reports *Nucleonics Week*. Ramanna says the experience gained from the FBTR has helped in the development of India's prototype fast breeder reactor, which is scheduled to be commissioned in 1990.

—C. Veeraraghavan, "Trial Commissioning of India's Fast Breeder Test Reactor (FBTR)...," *Nucleonics Week*, 24 January 1985, p. 14.

28 January 1985

Prime Minister Rajiv Gandhi and the prime ministers of Argentina, Greece, Mexico, Sweden, and Tanzania adopt a declaration calling on countries with nuclear weapons (United States, Soviet Union, Britain, France, and China) to sign a comprehensive treaty that will "halt production, testing and deployment of atomic arms and militarization of outer space." Furthermore, Gandhi insists India does not possess and will not pursue nuclear weapons. He states, "We have had it (nuclear capability) for almost 11 years now but we have not transformed that capability into weapons. We are committed not to make a nuclear bomb and we're not going to do it."

—Victoria Graham, "Six-nation Conference on Disarmament," Associated Press, 28 January 1985; in Lexis-Nexis Academic Universe, 28 January 1985, <http://web.lexis-nexis.com>; "Prime Minister Rajiv Gandhi Announced Today," United Press International, 29 January 1985; in Lexis-Nexis Academic Universe, 29 January 1985, <http://web.lexis-nexis.com>.

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2 February 1985

The first unit of the Rajasthan atomic power station (RAPS) is recommissioned and is re-synchronized with the national power grid after three years off line. Initially it will only be able to produce 50MW of electricity. The 220MW pressurized heavy water unit was originally shut down on 4 March 1982 because of chronic leakage problems in its end shields. The RAPS-1 nuclear power station originally began operation in 1973.

—"Energy; Nuclear Power Station Unit Recommissioned," BBC, 13 February 1985; in Lexis-Nexis Academic Universe, 13 February 1985, <http://web.lexis-nexis.com>; "Briefly: India," *Nucleonics Week*, 7 February 1985, p. 11.

7 February 1985

Minister of State for Atomic Energy Shivraj Patil reports to parliament that the Atomic Energy Commission (AEC) has approved a 15-year, \$14 billion program to increase India's nuclear power generating capacity to 10,000MW. The AEC intends to build twelve 235MW pressurized heavy water reactors (PHWRs) and ten 500MW PHWRs, with nine of the 235MW units to be commissioned between 1990 and 1995. The source of the remaining 2,180MW is not disclosed.

—"Briefly: India," *Nucleonics Week*, 7 February 1985, p. 11.

28 February 1985

India's Tarapur-1 nuclear power plant remains shut down for annual refueling and general maintenance work that began on 9 December 1984. Unit 1 of the Madras Atomic Power Station (MAPS-1) has also been shut down since 7 December 1984 for maintenance work, and is expected back on-line in mid-February.

—"Reactor Notes Pertaining to the Generating Table for January: India," *Nucleonics Week*, 28 February 1985, p. 16.

4 March 1985

Dr. Raja Ramanna, chairman of the Atomic Energy Commission (AEC), verifies that the nuclear waste facility at Tarapur has processed India's first 40-liter radioactive glass block. Furthermore, the bituminization unit became operational at the end of 1984, and the polymerization unit has been functioning for over a year-and-a-half.

—Kim Gordon-Bates, "India Set to Commission World's First Plant to use Mixed Carbide Fuel," *Nucleonics Week*, 14 March 1985, pp. 1-2.

6 March 1985

Unit 1 of the Madras Atomic Power Station (MAPS-1) is re-synchronized to the national power grid after being shut down since 7 December 1984.

—"Reactor Notes Pertaining to the Generating Table for January: India," *Nucleonics Week*, 2 May 1985, p. 16.

14 March 1985

Chairman of the Atomic Energy Commission (AEC) Dr. Raja Ramanna announces that the fast breeder test reactor (FBTR) at Kalpakkam will be commissioned in August or September of this year, after a year's delay. India's FBTR will be the world's first reactor to use mixed uranium-plutonium carbide fuel as its core. The Kalpakkam nuclear facility, which will also have a 500MW sodium cooled prototype fast breeder reactor by the year 2000, will soon be renamed the Indira Gandhi Center for Atomic Research (IGCAR).

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—Kim Gordon-Bates, "India Set to Commission World's First Plant to use Mixed Carbide Fuel," *Nucleonics Week*, 14 March 1985, pp. 1-2.

27 March 1985

India's Department of Atomic Energy (DAE) plans on starting work on 18 new nuclear power plants during the Seventh Five-Year Plan. Twelve plants will have a 235MW capacity; six will have a 500MW capacity. In the immediate future, two of the new units will be built in Rajasthan and two will be built in Karnataka. The sites of the remaining units have not been decided.

—"Energy; Plans for Nuclear Power Stations," New Delhi Home Service, 27 March 1985; in Lexis-Nexis Academic Universe, 4 April 1985, <http://web.lexis-nexis.com>.

1 April 1985

India and France agree to start joint projects in fast breeder nuclear reactors. The Chairman of the Indian Atomic Energy Commission (AEC), Dr. Raja Ramanna announces the commissioning of India's fast breeder test reactor (FBTR) at Kalpakkam.

—"France-Nuclear Energy Cooperation," Press Trust of India, 1 April 1985; in Lexis-Nexis Academic Universe, 10 April 1985, <http://web.lexis-nexis.com>.

25 April 1985

India's parliament debates the country's nuclear options in light of the Defense Minister P.V. Narasimha Rao's demand for an increase in grants as well as Pakistan's progress in nuclear fuel enrichment program. Some Indian analysts and politicians believe that Pakistan is on the threshold of building nuclear weapons.

—"Indian Parliament Debates on Nuclear Policy," Xinhua (Beijing), 25 April 1985; in Lexis-Nexis Academic Universe, 25 April 1985, <http://web.lexis-nexis.com>.

29 April 1985

Prime Minister Rajiv Gandhi notifies parliament that India will construct a total of 22 nuclear power reactors in the next 10 years. Upon completion, India's nuclear power capacity will be raised to 10,000MW.

—"India to Construct More Atomic Power Stations," Xinhua (Beijing), 29 April 1985; in Lexis-Nexis Academic Universe, 29 April 1985, <http://web.lexis-nexis.com>.

1 May 1985

The Madras nuclear power plant at Kalpakkam resumes operation with an output of 115MW. It has an overall generating capacity of 235MW.

—"Kalpakkam Atomic Station Resumes Generation," New Delhi Home Service, 1 May 1985; in Lexis-Nexis Academic Universe, 8 May 1985, <http://web.lexis-nexis.com>.

4 May 1985

During a two-day meeting of the ruling Congress Party, Indian Prime Minister Rajiv Gandhi warns that Pakistan is currently in the process of building a nuclear bomb. He states, "The government now has definite reports that Pakistan is going ahead with the development of nuclear weapons and this dangerous development will completely change the present military balance in the subcontinent." He continues, "We are looking into various

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aspects of this development and what action we should take."

—Paul Wedel, "India Weighs Response to Pakistani Nuclear Program," UPI, 4 May 1985; in Lexis-Nexis Academic Universe, 4 May 1985, <http://web.lexis-nexis.com>; "India Compelled to Review Its Nuclear Policy, Gandhi Says," Associated Press, 4 May 1985; in Lexis-Nexis Academic Universe, 4 May 1985, <http://web.lexis-nexis.com>.

5 May 1985

India's Department of Atomic Energy (DAE) announces India's nuclear power generation rose to a record 4,100 million kwh during 1984-85. This represents a 17 percent increase over the previous year. India currently has five operating nuclear power plants and research facilities and another one is expected to become operational during 1985-86. The DAE report also states that India's heavy water production went up nearly 90 percent; and the Uranium Corporation of India processed nearly 300,000 tonnes of ores and produced a record amount of uranium concentrate in 1984-85.

—"India's Nuclear Power Generation Hits Record," Xinhua (Beijing), 5 May 1985; in Lexis-Nexis Academic Universe, 5 May 1985, <http://web.lexis-nexis.com>.

7 May 1985

Pakistan Foreign Secretary Naiz A. Naik proposes to open up Pakistan's nuclear facilities to international inspections on a joint basis with India. He states, "Pakistan is willing to open its nuclear installation for inspection on a bilateral and reciprocal basis." Additionally, Naik says Pakistan is willing to "sign an agreement with India not to build nuclear weapons on a reciprocal basis."

—"Pakistan Proposes Agreement with India on Nuclear Inspections," UPI, 7 May 1985; in Lexis-Nexis Academic Universe, 7 May 1985, <http://web.lexis-nexis.com>.

17 May 1985

The United States and India sign an agreement which eases the transfer of US high technology such as computers, telecommunications, and other high-end technologies to India. US Commerce Secretary Malcolm Baldrige says the agreement does not include sensitive nuclear-related or military technology. He adds the agreement includes safeguards against transferred technology being diverted to the Soviet Union.

—Victoria Graham, "United States, India Sign Technology Agreement," Associated Press, 17 May 1985; in Lexis-Nexis Academic Universe, 17 May 1985, <http://web.lexis-nexis.com>.

22 May 1985

During his visit to Moscow, Indian Prime Minister Rajiv Gandhi calls on the United States to restrain Pakistan's nuclear weapons program. He states, "We are extremely worried about the Pakistani nuclear program. We feel the United States could do more to stop them from developing nuclear weapons and they are not doing so." Gandhi also feels Reagan's Strategic Defense Initiative proposal ("Star Wars") will only increase "the arms race and endanger the human race. We (India) feel it should not be undertaken."

—John Iams, "Indian Prime Minister Gandhi wrapped..." UPI, 22 May 1985; in Lexis-Nexis Academic Universe, 22 May 1985, <http://web.lexis-nexis.com>; Seth Mydans, "Gandhi Stresses India-Soviet Link," *New York Times*, 23 May 1985, p. A1.

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4 June 1985

In an interview on the US television show Good Morning America, Prime Minister Rajiv Gandhi categorically denies that India possesses nuclear weapons. Gandhi says, "We exploded an experimental device in 1974, and we have not carried out any more work on that line at all. We have not exploded any more devices. We have no stockpile. We do not have a nuclear weapon." Gandhi also rules out pre-emptive attacks on Pakistan's nuclear facilities. When asked how India would react to a Pakistani nuclear capability, Gandhi responds, "Then we would have to really re-think all our policies."

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 267-268.

5 June 1985

Prime Minister Rajiv Gandhi tells the French paper *Le Monde* that if India were to decide to become a nuclear power, it could do so within weeks or months. Gandhi further discloses that Indian scientists are continuing to work on refining nuclear explosives technology and have assured him that should the government ever want such a capability, it shall have it.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 268.

14 June 1985

The Indian Department of Atomic Energy (DAE) declares the heavy water plant at Talcher, Orissa, operational. The plant is expected to begin normal production in July 1985.

—"Heavy Water Plant in Orissa Operation," New Delhi Home Service, 14 June 1985; in Lexis-Nexis Academic Universe, 26 June 1985, <http://web.lexis-nexis.com>.

18 June 1985

Upon returning from his visit to the United States, Indian Prime Minister Rajiv Gandhi feels that the United States will help in preventing Pakistan from building a nuclear weapon. He states, "I am satisfied the United States will do everything it can to prevent Pakistan from making a nuclear weapon. That, of course, does not mean that Pakistan will not make a nuclear weapon."

—"Gandhi says US, Indian Viewpoints 'much closer'," UPI, 18 June 1985; in Lexis-Nexis Academic Universe, 18 June 1985, <http://web.lexis-nexis.com>.

28 June 1985

The *Guardian* (London) reviews India's internal debate on nuclear policy. It reports that India's pro-bomb lobby recently held a discussion in New Delhi on nuclear threats and India's options. The participants included retired civil servants, army officers, defense and foreign affairs policy analysts, members of parliament and the Speaker of the Lok Sabha (India's lower house of parliament), Dr. Balram Jhakar. The consensus among the members was that India must not remain a non-nuclear state. Further, "the [Indian] government was advised not to declare its intention; it could act secretly and did not have to 'articulate' its decision before the explosion." However, in a countervailing response, members of the Committee for a Sane Nuclear Policy (COSNUP) called on the Indian prime minister to "declare unequivocally that India has no plans to go for nuclear weapons." In addition, the latter

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appealed to the Indian government to seek ways "along with Pakistan, of ensuring that India, Pakistan, and the whole of South Asia and the Indian Ocean remain a nuclear free zone."

—Dhirendra Sharma, "Domination Theory/Nuclear Capabilities," *The Guardian* (London), 28 June 1985; in Lexis-Nexis Academic Universe, 28 June 1985, <http://web.lexis-nexis.com>.

6 July 1985

During the inauguration of a national youth festival, Indian Prime Minister Rajiv Gandhi urges India's youth "to raise their voice against [the] nuclear arms race in order to usher in world peace."

—"Gandhi Urges Youth to Oppose Nuclear Weapons," Press Trust of India, 6 July 1985; in Lexis-Nexis Academic Universe, 8 July 1985, <http://web.lexis-nexis.com>.

11 July 1985

The US television program Good Morning America reports that Pakistan has successfully tested the non-nuclear package of a nuclear device. This entails the detonation of the conventional explosive lenses around a non-nuclear core to simulate a nuclear explosion under laboratory conditions.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 270.

15 July 1985

Mr. Srinivasan, chairman of the Hyderabad-based Nuclear Fuel Complex (NFC), announces that the entity will increase its production capacity of uranium oxide fuel to meet the needs of India's nuclear power plants by 2000.

—"Expansion of Hyderabad Nuclear Fuel Complex," New Delhi Home Service, 15 July 1985; in Lexis-Nexis Academic Universe, 17 July 1985, <http://web.lexis-nexis.com>.

22 July 1985

Following Indian Prime Minister Gandhi's statement that Pakistan was close to manufacturing a nuclear weapon, the Bharatiya Janata Party (BJP) urges Gandhi's government to develop a nuclear weapon. The Press Trust of India news agency quotes a BJP spokesperson saying that "Mr. Gandhi's government should take immediate steps to develop our own nuclear bomb in view of reports that the threat of a Pakistani nuclear bomb is real."

—"India Rightists want Bomb," *New York Times*, 23 June 1985, p. 3.

26 July 1985

According to the Press Trust of India, the first 235MW unit of India's Madras Nuclear Power Plant (MAPP-1) resumed power generation today. Presently, the plant is generating 50MW to the Tamil Nadu power grid.

—"Atomic Power Station in South India Resumes Operation," Xinhua (Beijing), 26 July 1986; in Lexis-Nexis Academic Universe, 26 July 1986, <http://web.lexis-nexis.com>.

31 July 1985

Addressing the Indian Parliament, Minister of State for Science and Technology Shivraj Patil says India "will have enough indigenous nuclear fuel to support its nuclear energy program of 10,000MW of installed capacity by the year 2000." Presently, India's installed nuclear generating capacity is 1,230MW and by 1990 should reach 1,700MW. By the year 2000, India's nuclear power plants are expected to generate 10 percent of its electricity

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needs.

—"India to Develop Nuclear Power," Xinhua (Beijing), 31 July 1986; in Lexis-Nexis Academic Universe; 31 July 1986, <http://web.lexis-nexis.com>.

7 August 1985

India's Minister of State for External Affairs tells Rajya Sabha (India's upper house of parliament) that if Pakistan goes nuclear "we will reply...stone by stone." He adds that India has the capability to produce nuclear weapons but does not believe in flaunting its capability like its neighbor.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 270.

8 August 1985

India's Department of Atomic Energy (DAE) announces that the 100MW nuclear research reactor named Dhruva has become operational, and will begin production in November 1985. Capable of producing weapons-grade plutonium, Dhruva is the largest of six nuclear reactors at the Bhabha Atomic Research Center (BARC), Trombay. The Dhruva is not subject to inspection by the International Atomic Energy Agency (IAEA). Corresponding to this announcement, Prime Minister Rajiv Gandhi's government notifies parliament that it "was keeping its nuclear options open," and it would "respond suitably" if Pakistan develops a nuclear weapon. Indian Minister of State for External Affairs, Khursheed Alam Khan adds, "Available evidence and public statements by Pakistan scientists suggest that Pakistan has been relentlessly pursuing the objective of acquiring the wherewithal to manufacture nuclear weapons."

—"Reactor Begin Operations, Authorities say," Associated Press, 9 August 1985; in Lexis-Nexis Academic Universe, 9 August 1985, <http://web.lexis-nexis.com>; Stephen R. Wilson, "Nuclear Competition Brewing Between India and Pakistan," Associated Press, 22 August 1985; in Lexis-Nexis Academic Universe, 22 August 1985, <http://web.lexis-nexis.com>.

15 August 1985

India's first 50MW fast breeder test reactor is scheduled to become operational in September 1985.

—"Fast Breeder Test Reactor," Press Trust of India, 15 August 1985; in Lexis-Nexis Academic Universe, 28 August 1985, <http://web.lexis-nexis.com>.

19 August 1985

In an address to the Pakistan National Assembly, Pakistani Minister of State for Foreign Affairs Zain Noorani states that Pakistan does not have the capacity or the intent to produce nuclear weapons, and is willing to join India in a binding international agreement to renounce nuclear weapons. He added, "We firmly hold the view that a non-nuclear regime in South Asia will be in the best interest of all countries in the region." India believes a South Asian nuclear free zone is unworkable because China, India eastern neighbor and potential adversary, already possesses nuclear weapons.

—"Pakistan Official calls on India to Jointly Renounce Nuclear Weapons," Xinhua (Beijing), 18 August 1985; in Lexis-Nexis Academic Universe, 18 August 1985, <http://web.lexis-nexis.com>; Stephen R. Wilson, "Nuclear Competition

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Brewing Between India and Pakistan," Associated Press, 22 August 1985; in Lexis-Nexis Academic Universe, 22 August 1985, <http://web.lexis-nexis.com>.

7 September 1985

The Tarapur-1 reactor is shut for maintenance work on a recirculation pump discharge valve.

—"India's Rapp-1...", *Nucleonics Week*, 5 December 1985, p. 15.

16 September 1985

During a meeting with a visiting US delegation, Indian foreign secretary Romesh Bhandari asks US Assistant Secretary of State Michael H. Armacost "to prevent Pakistan from using its nuclear program to produce atomic weapons."

—"India Asks US to monitor Pakistan Nuke Program," UPI, 16 September 1985; in Lexis-Nexis Academic Universe, 16 September 1985, <http://web.lexis-nexis.com>.

October 1985

Prime Minister Rajiv Gandhi forms a small committee of experts and tasks them with outlining the architecture and costs of a potential nuclear deterrent. The committee members include Atomic Energy Commission (AEC) Chairman Dr. Raja Ramanna and strategic analyst K. Subrahmanyam.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 273.

6 October 1985

During an interview with *Newsweek* magazine, Indian Prime Minister Rajiv Gandhi is quoted as saying that India has firm evidence that Pakistan is manufacturing a nuclear weapon. Gandhi also calls on the United States to suspend military aid to Pakistan.

—"Pakistan Making Nuclear Weapon," Kyodo Press Service (Tokyo), 6 October 1985; in Lexis-Nexis Academic Universe, 7 October 1985, <http://web.lexis-nexis.com>.

14 October 1985

During a press conference in Ahmedabad, Bharatiya Janata Party (BJP) President Atal Bihari Vajpayee stresses the need for India to strengthen its defense along the border with Pakistan. He also says the BJP believes that India should produce a nuclear weapon.

—"Opposition Party wants Production of Nuclear Weapons," New Delhi Home Service, 14 October 1985; in Lexis-Nexis Academic Universe, 16 October 1985, <http://web.lexis-nexis.com>.

18 October 1985

In an address to the Delhi Rotary Club, India's Chief of Army Staff General A.S. Vaidya cites unspecified reports saying that Pakistan is planning to test a nuclear device in the western Chinese province of Xinjiang.

—"Foreign News Briefs," UPI, 18 October 1985; in Lexis-Nexis Academic Universe, 18 October 1985, [www.lexis-nexis.com](http://web.lexis-nexis.com).

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20 October 1985

Dr. Raja Ramanna, head of India's Atomic Energy Commission (AEC), announces the start up of the \$58 million fast breed test reactor (FBTR) at Kalpakkam, 30 miles south of Madras. The operation of this reactor is seen as a "landmark" in India's nuclear program because it is the first to use mixed carbide fuel of 70 percent plutonium and 30 percent natural uranium carbide as a full core. The mixed carbide fuel was developed at the Bhabha Atomic Research Center (BARC) in Trombay. Most nuclear reactors require enriched uranium as a fuel, a product not made in India. According to *Nucleonics Week*, "The technology for handling the sodium, used as a coolant and heat transmission medium, as well as equipment such as sodium pump, control systems, and other structural parts, also came from India." Fast breeder reactors produce more plutonium, a material which can be used in atomic weapons, than they consume. India is currently working on a 500MW prototype fast breeder reactor that will also use plutonium-uranium carbide fuel.

—Brahma Chellaney, "India Becomes First Nation to Use Uranium-Plutonium Carbide Fuel," Associated Press, 20 October 1985; in Lexis-Nexis Academic Universe, 20 October 1985, <http://web.lexis-nexis.com>; Vyvyan Tenorio, "India's 40MW RBTR Went Critical Last Week at Kalpakkam," *Nucleonics Week*, 24 October 1985, p. 5.

23 October 1985

While addressing the United Nations General Assembly, Pakistani President Mohammad Zia ul-Haq reaffirms "Pakistan's policy of developing nuclear energy for peaceful purposes only, and its irrevocable commitment not to acquire nuclear weapons and nuclear explosives." Furthermore, he states that Pakistan is ready to enter "any agreement or arrangement with India on the basis of sovereignty and reciprocity to keep our area free of nuclear weapons."

—J.T. Nguyen, "United Nations-Pakistan," UPI, 23 October 1985; in Lexis-Nexis Academic Universe, 23 October 1985, <http://web.lexis-nexis.com>.

24 October 1985

Tarapur-1 is brought back online after being shut down since 7 September 1985 for maintenance work on a recirculation pump discharge valve.

—"India's Rapp-1...", *Nucleonics Week*, 5 December 1985, p. 15.

27 October 1985

Indian Prime Minister Rajiv Gandhi calls the latest meeting with Pakistani President Mohammad Zia ul-Haq "very definitely" productive and bilateral talks will soon begin on improving border security and economic cooperation. Gandhi adds "technical" exchanges on nuclear questions were also under consideration. Later, an Indian government official denies that exchanges on the nuclear issue are being planned.

—Steven R. Weisman, "India and Pakistan Edge a Bit Closer," *New York Times*, 27 October 1985, p. 3.

November 1985

The committee tasked with assessing the potential cost of a nuclear deterrent holds its last meeting. During this meeting, Prime Minister Rajiv Gandhi is advised by an economic advisor that the high cost of a nuclear deterrent will have an adverse impact on the Indian economy. Gandhi also solicits views from the Chief of Naval Staff Admiral Tahlani. Tahlani, the highest military representative on the committee, demurs saying that he would prefer to

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give a studied answer to the prime minister's query. In the aftermath of the meeting, Subrahmanyam, Ramanna, and Tahlani form an informal committee to arrive at cost-estimates for an Indian nuclear force.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 273-274.

November 1985

Admiral Tahlani forms a sub-committee comprising the Army Vice Chief of Staff, General K. Sundarji, Navy Vice Chief of Staff, K.K. Nayyar, and Deputy Chief of Air Staff, John Greene, to work with the Atomic Energy Commission's (AEC) R. Chidambaram, and Defense Research and Development Organization's (DRDO) Abdul Kalam, to outline India's nuclear force requirements and arrive at cost-estimates.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 274.

1 November 1985

Indian Prime Minister Rajiv Gandhi says India is not "closing the option" to make nuclear weapons." But, he adds India's "intention is clearly not to make a weapon." Furthermore, Gandhi rules out any bilateral negotiations on nuclear non-proliferation with Pakistan because "India does not have a nuclear weapons program."

—"Nuclear Weapons are still an Option, Gandhi Reiterates," Inter Press Service, 1 November 1985; in Lexis-Nexis Academic Universe, 1 November 1985, <http://web.lexis-nexis.com>; "India not Closing Options on Nuclear Weapons," BBC, 4 November 1985; in Lexis-Nexis Academic Universe, 4 November 1985, <http://web.lexis-nexis.com>.

10 November 1985

Chairman of the Indian Atomic Energy Commission (AEC) Dr. Raja Ramanna announces that India has no plans to conduct any nuclear test similar to the one conducted at Pokhran, Rajasthan, in 1974. He states, "Our nuclear program is entirely for peaceful purposes and we are not proposing to conduct any test explosion."

—"India Nuclear Program 'for Peaceful Purposes,'" Press Trust of India, 10 November 1985; in Lexis-Nexis Academic Universe, 12 November 1985, <http://web.lexis-nexis.com>.

11 November 1985

Indian Prime Minister Rajiv Gandhi inaugurates India's first indigenously built nuclear research reactor, Dhruva. The Dhruva unit is the "only high-powered reactor in the world which uses natural uranium, clad in aluminum."

—"Dedication of First Indian-built nuclear Reactor," New Delhi Home Service, 11 November 1985; in Lexis-Nexis Academic Universe, 13 November 1985, <http://web.lexis-nexis.com>.

17 November 1985

The opposition Bharatiya Janata Party (BJP) President Atal Bihari Vajpayee states that the Gandhi government should declare its nuclear intentions openly, "so that it might deter Pakistan from going nuclear."

—"President of Janata Party supports making of Atom Bomb," Press Trust of India, 17 November 1985; in Lexis-Nexis Academic Universe, 19 November 1985, <http://web.lexis-nexis.com>.

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20 November 1985

In an address to the Lok Sabha (India's lower house of Parliament), Indian Foreign Minister Bali Ram Bhagat says Pakistan has produced enough weapons-grade nuclear material to make three to five nuclear bombs. "The fact that Pakistan is going ahead with a nuclear weapon program introduces a new element in the entire security dimension and India is keeping that in mind and is alert and vigilant," says Bhagat.

—Jonathan S. Landay, "India says Pakistan has Material for Three to Five A-Bombs," UPI, 20 November 1985; in Lexis-Nexis Academic Universe, 20 November 1985, <http://web.lexis-nexis.com>.

25 November 1985

Leonard Spector, a proliferation expert at the Carnegie Endowment for International Peace, says that India has increased its nuclear weapons production capacity by "more than 1,000 percent" since its first nuclear explosion in 1974. He bases this assumption on India's construction of a "sizeable power reactor" and an "unusually large research reactor" this past year. Neither of these reactors is subject to international inspection.

—George Gedda, "India, Pakistan Increase Nuclear Capability, Expert Says," Associated Press, 25 November 1985; in Lexis-Nexis Academic Universe, 25 November 1985, <http://web.lexis-nexis.com>.

30 November 1985

During a Japan National Press Club luncheon, Indian Prime Minister Rajiv Gandhi says India will not sign the Nuclear Non-Proliferation Treaty.

—"Indian Prime Minister...," UPI, 30 November 1985; in Lexis-Nexis Academic Universe, 30 November 1985, <http://web.lexis-nexis.com>.

1985

The committee tasked with outlining the architecture and cost estimates of nuclear deterrent force for India produces its report. The report recommends that India build a "minimum deterrent" that contains nuclear warheads in "low three digits," and accept a doctrine of "no-first-use." Such a nuclear force is estimated to cost 70 billion rupees (\$5.7 billion) over ten years. Three copies of the report are produced. One is submitted to the prime minister, one is submitted to the Chiefs of Staff Committee, and the third copy is retained by General K. Sundarji.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 274.

5 December 1985

Nucleonics Week reports that Unit 1 of the Rajasthan Atomic Power Station (RAPS-1) is still shut down for continuing repairs on its end-shield leak.

—"India's Rapp-1...," *Nucleonics Week*, 5 December 1985, p. 15.

11 December 1985

In an interview to foreign journalists, Indian Prime Minister Rajiv Gandhi outlines steps in which Pakistan can prove it is not constructing a nuclear bomb. He says, "We have been talking about this and may be the first thing they [Pakistan] could convince us about is where all the enriched uranium is going because they don't seem to have any ostensible use for it. That is a really the starting point. If we knew where it has gone, there is no other problem."

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—John Elliott, "Gandhi Challenges Zia over Nuclear Bomb; Indian Premier Asks what is Made of Enriched Uranium Output," *Financial Times* (London), 11 December 1985, p. 4; in Lexis-Nexis Academic Universe, 11 December 1985, <http://web.lexis-nexis.com>.

17 December 1985

At a joint news conference in New Delhi, Indian Prime Minister Rajiv Gandhi and Pakistani President Mohammad Zia ul-Haq jointly announce they have pledged to "expand trade and economic ties, resume talks on a peace treaty, reduce border tensions, and investigate each others' allegations of cross-border subversion." They also agree "not to attack each other's nuclear plants." President Zia says, "The most important aspect [of the talks] is that we have decided not to attack each other's nuclear facilities." Gandhi adds the agreement was "a first step in establishing confidence in each other. We cannot jump to the final step without going through a process of confidence building."

—Stephen Wilson, "India and Pakistan Pledge Not to Destroy Each Other's Nuclear Plants," Associated Press, 17 December 1985; in Lexis-Nexis Academic Universe, 11 December 1985, <http://web.lexis-nexis.com>; Steven Weisman, "Gandhi-Zia Talks Said to Bear Fruit," *New York Times*, 18 December 1985, p. 3.

Late 1985-Early 1986

Prime Minister Rajiv Gandhi does not act on the nuclear task force's recommendations. The Atomic Energy Commission (AEC) privately advises the prime minister that India is not ready to bear the economic burdens of building a nuclear force. Rather, the country should wait until the development of missile based delivery systems, and then create a separate service to control nuclear weapons.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 275.

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1984

1984

Israel reportedly broaches India on plans to strike Pakistan's uranium enrichment plant at Kahuta. According to the Israeli proposal, the strike against Kahuta would be conducted using Israeli combat aircraft, with logistical help from India. As a first step, Israeli warplanes would use the Indian Air Force (IAF) base in Jamnagar close to the Kutch coast, from where they would fly off to refuel at a satellite airfield somewhere in northern India. In the final stage, the planes would fly on the lee side of the Himalayas to avoid early radar detection before penetrating Pakistani airspace, thus giving the Pakistani Air Force (PAF) little time to react. Prime Minister Indira Gandhi initially agrees to the plan. But she later vetoes it after being warned of the potential for negative reactions from the United States.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 349-350.

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4 January 1984

Speaking at the opening meeting of the 71st Session of the Indian Science Congress, Prime Minister Indira Gandhi charges that while the nuclear powers were continually adding to their nuclear weapon stockpiles, they are restricting peaceful nuclear assistance to developing countries. She claims that any assistance in nuclear technology from the West is circumscribed by numerous restrictions and safeguards. "Nuclear safeguards are just a rich nation's bogey," she stresses. For India, Gandhi advises a "self-reliant, home-grown nuclear capability for peaceful and developmental purposes." She describes the Kalpakkam nuclear power facility as a "milestone" of self-reliance.

—"Indian Prime Minister Criticizes Some Powers' Nuclear Policy," Xinhua (Beijing), 4 January 1984; in Lexis-Nexis Academic Universe, 4 January 1984, <http://web.lexis-nexis.com>.

27 January 1984

The first 200MW unit of the Kalpakkam Nuclear Power Station (KAPS) near Madras begins commercial operations.

—"Kalpakkam Nuclear Power Station on Load," New Delhi Home Service, BBC Summary of World Broadcasts, 27 January 1984; in Lexis-Nexis Academic Universe, 8 February 1984, <http://web.lexis-nexis.com>.

February 1984

Pakistani nuclear scientist A.Q. Khan publicly boasts that Pakistan has acquired the capability to enrich uranium, which means that it can produce a nuclear bomb at short notice.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 252-253.

29 March 1984

Indian Foreign Ministry spokesperson Salman Haider denies a report by the Associated Press (AP) in which the Indian foreign secretary is quoted as saying that Pakistan has a nuclear device and may have tested it at a Chinese test site. Haider says, "The foreign secretary categorically denies the remarks attributed to him."

—"Indian Foreign Ministry Denies Statement on Pakistani A-Bomb," Xinhua (Beijing), 29 March 1984; in Lexis-Nexis Academic Universe, 29 March 1984, <http://web.lexis-nexis.com>.

30 March 1984

Indian foreign minister Narasimha Rao addresses parliamentary concerns about the progress in Pakistan's nuclear weapons program, as well as reports in the United States about alleged Chinese-Pakistani nuclear cooperation. Rao, while rebutting Pakistan's claims that it has self-sufficiency in nuclear technology, assures parliament that "government is vigilant in the matter. Indian scientists are keeping abreast of all aspects of research and development connected with modern and relevant technologies."

—Cited in, George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 254.

April 1984

The Advanced Technology Vessel (ATV) project to build a nuclear submarine gets underway; Vice Admiral Mihir Roy is appointed project director. The submarine's original design plans involve two nuclear reactors using

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enriched uranium to muster surge capacity for maneuver and sustained speeds. However, the design is later dropped for one that involves building the hull around a single reactor. Among reasons cited for changes in the design plan: the inability of the uranium enrichment facility in Mysore to support a fleet of small submarines; a single power plant being simpler to build; and the Navy's eagerness to acquire a nuclear submarine in the shortest time possible. As part of construction plans, the Bhabha Atomic Research Center (BARC) decides to build a dry dock facility at Kalpakkam to build and test the submarine's reactor.

—Raj Chengappa, "Arsenal For The Gods," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 289; Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), p. 651.

2 May 1984

The director of the Bhabha Atomic Research Center (BARC) reports that India has constructed its first indigenous nuclear waste disposal plant, named the Nuclear Waste Immobilization Plant (NWIP), at the Tarapur Atomic Power Plant. A second nuclear waste disposal plant is being built at BARC, and will become operational by the end of the year.

—"India Builds First Nuclear Waste Disposal Plant," Xinhua (Beijing), 2 May 1984; in Lexis-Nexis Academic Universe, 2 May 1984, <http://web.lexis-nexis.com>.

7 May 1984

The Dhruva or R-5 research reactor at Trombay is expected to be commissioned in about three months, and the second unit of the Madras nuclear power station will be commissioned in a year's time.

—"Atomic Energy," New Delhi Home Service, BBC Summary of World Broadcasts, 7 May 1984, in Lexis-Nexis Academic Universe, 16 May 1984, <http://web.lexis-nexis.com>.

8 May 1984

India's Atomic Energy Commission (AEC) Chairman Dr. Raja Ramanna says India is considering a Soviet offer of light water nuclear reactors to help India increase its nuclear power generation. Ramanna notes, however, that the Soviet offer of enriched uranium fueled reactors goes against India's planned nuclear program based on natural uranium and heavy water reactors. India plans to have an installed nuclear generation capacity of 10,000MW by the year 2000, equivalent to about 10 percent of the country's total power generating capacity.

—"India May Buy Soviet Reactor," Xinhua (Beijing), 8 May 1984; in Lexis-Nexis Academic Universe, 8 May 1984, <http://web.lexis-nexis.com>.

22 May 1984

The prime ministers of India, Sweden, Mexico, Tanzania, Greece, and Argentina issue a joint declaration calling on the nuclear weapon powers to end the arms race. Issued simultaneously in the six nations' capitals, the declaration states, "We urge, as a necessary first step, the United States and the Soviet Union, as well as the United Kingdom, France, and China, to halt all testing, production, and deployment of nuclear weapons and their delivery systems, to be immediately followed by substantial reductions in nuclear forces."

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—"Nuclear Powers Urged to Halt Nuclear Arms Race," Xinhua (Beijing), 22 May 1984; in Lexis-Nexis Academic Universe, 22 May 1984, <http://web.lexis-nexis.com>.

5 June 1984

The Chairman of the Atomic Energy Commission (AEC), Dr. Raja Ramanna says India will add 20 nuclear reactors through out the country by the year 2000. Also, Ramanna reports, the country has become self-sufficient in uranium and heavy water production.

—"20 Nuclear Power Reactors Proposed for India," Xinhua (Beijing), 5 June 2003; in Lexis-Nexis Academic Universe, 5 June 1984, <http://web.lexis-nexis.com>.

11 June 1984

Dr. Raja Ramanna, chairman of India's Atomic Energy Commission (AEC), gives a review of India's atomic energy program. He says both 210MW units at the US-built Tarapur Atomic Power Station (TAPS) are functioning, although at a reduced capacity of 130-140MW each. Also, Unit 1 at Rajasthan, which has been plagued by coolant leaks, has been out of commission for at least "six months." Unit 2 of the Rajasthan plant is working at "acceptable levels." According to Ramanna, Unit 1 at Kalpakkam near Madras is also working at "acceptable levels." Of India's heavy water plants, four of five are working normally. Presently, India has an installed nuclear generating capacity of 1,200MW, with a further 1,200MW under construction.

—Ian Hargreaves, "Skepticism over Ambitions Targets," *Financial Times* (London), 11 June 1984, p. IX; in Lexis-Nexis Academic Universe, 11 June 1984, <http://web.lexis-nexis.com>.

June 1984

India's Department of Atomic Energy (DAE) announces the setting up of the Nuclear Power Board (NPB) to oversee the design, construction, operations and maintenance of India's nuclear power stations, as well as personnel training and planning. DAE's current director of the power project engineering division, M.R. Srinivasan, is appointed as the first chairman and chief executive of the NPB. Sources say New Delhi created the NPB in order to channel resources into nuclear power plant construction and operations, now that India has set a goal of reaching a 10,000MW nuclear generating capacity by the year 2000. Until now, the DAE was responsible for all nuclear-related activities. The DAE will still have direct control over nuclear research and development activities.

—"India Has Set Up A Nuclear Power Board to Build and Run...," *Nucleonics Week*, 7 June 1984, pp. 5-6.

2 July 1984

India's new research reactor, Dhruva, is expected to be commissioned on 15 August.

—"Nuclear Reactor Development," New Delhi Home Service, BBC Summary of World Broadcasts, 2 July 1984; in Lexis-Nexis Academic Universe, 11 July 1984, <http://web.lexis-nexis.com>.

7 August 1984

India's Minister of State for Atomic Energy tells parliament that the Indian government will not agree to any international inspections of India's atomic power plants or other nuclear facilities so long as developed countries do not agree to equivalent inspections. The minister adds that despite difficulties, Indian scientists will ultimately succeed in building atomic power plants and fabricating heavy water to run those plants.

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—"India Rejects International Inspection of Atomic Power Plants," Xinhua (Beijing), 7 August 1984; in Lexis-Nexis Academic Universe, 7 August 1984, <http://web.lexis-nexis.com>.

9 August 1984

Shivraj Patil, Minister of State for Science and Technology, tells parliament India has succeeded in developing a mixture of carbide fuel made of plutonium carbide and uranium carbide for use in its fast breeder reactors. The fuel will be available in time for the commissioning of India's first fast breeder reactor at Kalpakkam near Madras in December of this year. The commissioning of the Kalpakkam fast breeder reactor will mark the beginning of the second stage of India's nuclear program.

—"India Succeeds in Developing Nuclear Fuel," Xinhua (Beijing), 9 August 1984; in Lexis-Nexis Academic Universe, 9 August 1984, <http://web.lexis-nexis.com>.

August 1984

According to K.S.N. Murthy, Project Director, Unit 1 of the 235MW Madras Atomic Power Plant (MAPP-1) has produced a total of 769,000 megawatt-hours of power since it became operational in 1983. From the time when it was declared ready for commercial production in January 1984, Murthy reports it has recorded an average "operational factor" of 76 percent and an average "load factor" of 60 percent. He says the "output has ranged from 86.7MWH in February to 127.5MWH in April to 95.4MWH in June."

Originally scheduled to be commissioned in 1977, construction of MAPP-1 was completed in 1982. Startup was delayed because of a constant shortage of heavy water. MAPP-2 is expected to be commissioned in 1985. The MAPP-1 was built with 90 percent indigenously manufactured components. The reactors were built by the Indian manufacturer Larsen & Toubro, which also supplied Unit 2 for the Rajasthan Atomic Power Station (RAPS). The DAE says India plans on building 10 additional 235MW nuclear power plants, and 12 plants with a 500MW generating capacity are currently under development. Although DAE officials have been pleased with the initial operation of MAPP-1, some sources say the facility has been plagued by the loss of experienced technicians to higher paying construction projects in the Middle East.

India's experience with the MAPP-1 nuclear power plant has strengthened its nuclear program policy of keeping its nuclear power facilities outside of international safeguards. Indian nuclear officials and engineers are also confident of India's capacity to produce sufficient heavy water to support India's expanding program. "Like uranium, heavy water is not always available in the international market without discriminatory safeguards conditions, which we cannot accept for our unsafeguarded power reactors," says an Indian nuclear official. The heavy water plant at Nangal has been in operation for over 20 years, and the plants at Baroda and Tuticorin are working at "quite satisfactory" levels since an explosion at the Baroda plant in 1977. The production capacity of the Kota plant is being "cautiously increased in view of the complex technical problems concerning environmental safety in the process," say nuclear officials. The Kota plant is now producing nuclear grade heavy water and is expected to be operating at full capacity by this October. "It is therefore a matter of some pride for us that today that we have become self-sufficient in the uranium, heavy water, and nuclear power programs," say Indian nuclear officials in a recent report.

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—James Branscome, "India Reports Good Experience with First Indigenous Reactor," *Nucleonics Week*, 16 August 1984, p. 9.

Early October 1984

Reports appearing in the US media allege that US intelligence has briefed Congress that Indian military advisors are asking Prime Minister Indira Gandhi for permission to attack Pakistan's uranium enrichment facility at Kahuta. However, US State Department officials downplay the reports as alarmist. The intelligence is apparently based on the inability of US intelligence sources to locate two Jaguar squadrons based at Ambala, Punjab. This leads to speculation that the squadrons could have been relocated in preparation for a possible pre-emptive strike on Pakistan. A senior Indian Air Force officer later discloses that the Jaguars were hidden in the woods adjacent to the airfield in Ambala as part of a passive air defense drill.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 258.

10 October 1984

The US Ambassador to Pakistan Dean Hinton publicly warns New Delhi that the United States will be "responsive" if India attacks Pakistan.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 258.

11 October 1984

Prime Minister Indira Gandhi tells a gathering of Indian Army commanders that "Pakistan's nuclear program has brought about a qualitative change in our security environment."

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 258.

23 October 1984

A hydrogen sulfide leak at the heavy water plant at Kota results in the death of one plant engineer and serious injuries to three others. The plant is shut down following the leak.

—"A Leak of Hydrogen Sulfide in the Indian Heavy Water Plant at Kota...," *Nucleonics Week*, 8 November 1984, p. 2.

3 November 1984

Following the assassination of Prime Minister Indira Gandhi, India's newly instated Prime Minister Rajiv Gandhi (Indira Gandhi's son) criticizes the United States for its \$325 million military aid package to Pakistan. He says, "India is concerned over regional security, reports about Pakistan's nuclear weapons program, and the US arms supply to Pakistan." India is also concerned with reports that US President Ronald Reagan has offered to place Pakistan under its nuclear umbrella in return for Pakistan halting its nuclear weapons program. However, Rajiv Gandhi believes Indo-US friendship is still strong and "there is a good base for building it up."

—Steve Hagey, "Rajiv Gandhi Criticizes US Policy," UPI, 3 November 1984; in Lexis-Nexis Academic Universe, 3 November 1984, <http://web.lexis-nexis.com>.

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20 November 1984

United States and India sign a Memorandum of Understanding (MOU) regarding the sale of high technology products and technology transfers, including supercomputers for civilian use. The agreement also covers defense items such as radars, air navigation systems and other military hardware. The United States has been blocking the sale of computers to India because some in Washington fear the technology would be used to support India's nuclear weapons program or would be transferred to the Soviet Union.

—John Elliott, "US Eases Curbs on High Technology Exports to India," *Financial Times* (London), 20 November 1984, p. 14; in Lexis-Nexis Academic Universe, 20 November 1984, <http://web.lexis-nexis.com>.

December 1984

Foreign Report, an intelligence newsletter prepared by the *Economist*, reports that India can test a nuclear device within two months and Indian scientists are perhaps working on the design of a thermonuclear weapon.

—Cited in, George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 259.

17 December 1984

N. Srinivasan, Head of the Department of Atomic Energy's (DAE) heavy water division, reports India has reached a breakthrough in research for a new process in producing heavy water. Researchers at the pilot Baroda plant "have succeeded in setting up a new water-ammonia exchange loop capable of transferring deuterium from water to ammonia," reports *Nuclear Fuel*. According to a DAE report, its primary concern in the field of heavy water production is its dependence on the fertilizer industry. For example, the heavy water plant at Talcher, which uses ammonia-hydrogen exchange principle, has not been operating at full capacity because of production limitations at the neighboring fertilizer plant. Because of these production delays, the fertilizer plant is frequently unable to supply synthesis gas to the heavy water plant. However, the ammonia-hydrogen exchange-based heavy water plant, currently being constructed at Thal-Vaishet, with the help of the Rashtriya Chemicals & Fertilizer Ltd, is making "considerable progress." To date, the heavy water plants at Talcher, Tuticorin, and Baroda's older facility are using the ammonia-hydrogen exchange process. The hydrogen distillation based heavy water plant at Nangal has been plagued by frequent local power outages. From September 1983 to July 1983, the Nangal facility was shut down because of this reason. DAE's heavy water plant at Kota uses the hydrogen-hydrogen sulfide system. India's future heavy water facility at Manuguru (to be commissioned in 1988) will also use the hydrogen-hydrogen sulfide system.

—"Indians Announce Breakthrough in Heavy Water," *Nuclear Fuel*, 17 December 1984, pp. 2-3.

19 December 1984

The Chairman of India's Nuclear Power Board (NPB), M.R. Srinivasan, reports that India has "achieved near self-sufficiency in components of atomic power reactors." He adds, "A majority of the components used at Narora and Kalpakkam atomic power plants were supplied by our own manufacturers." Also, he says that a special team was created to design 235MW and 500MW nuclear power plants. These plants would be placed in different parts of India. Additional heavy water production plants are to be set up in Maharashtra and in Andhra Pradesh, and a proposal to place a plant in south Gujarat is under consideration. Heavy water contains deuterium and is used as a cooling agent in heavy water reactors.

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—"India Self-Sufficient in Atomic Reactor Components," Xinhua (Beijing), 19 December 1984; in Lexis-Nexis Academic Universe, 19 December 1984, <http://web.lexis-nexis.com>.

1984

The Indian Air Force (IAF) begins coordinating activities with the Bhabha Atomic Research Center (BARC) and the Defense Research and Development Organization (DRDO) to weaponize an air-deliverable nuclear device. A team of IAF officers led by the Deputy Air Chief of Staff Johnny Green meets engineers and nuclear scientists to design and test air-droppable canisters capable of carrying nuclear warheads. Certain aircraft from within the IAF's existing Jaguar squadrons are earmarked for test preparations. However, the Mirage 2000 is found more suitable due to the Jaguar's shortcomings with ground-clearance problems.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 351.

Late 1984-Early 1985

Speculative West German and US intelligence reports suggest that Indian scientists may have begun working on the design of a thermonuclear device. Among the evidence cited to support this conclusion, is the Indian Department of Atomic Energy's (DAE) decision to set up an inertial confinement fusion (ICF) program. An ICF program, the analysts believe, will allow Indian nuclear scientists to study the physics associated with thermonuclear explosions; it will allow them to create computer codes for nuclear weapon designs. In addition, evidence suggests that India is acquiring the technical capability to separate lithium-6, which when mixed with deuterium forms lithium-6 deuteride, used in the secondary of a thermonuclear device.

—George Perkovich, "Nuclear Capabilities Grow," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 270-271.

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1983

Early 1983

The Bhabha Atomic Research Center (BARC) reportedly develops a boosted-fission weapon design. The tritium required for the boosted device is probably acquired through irradiating lithium in nuclear reactors.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles & London: University of California Press, 1999), p. 242.

February 1983

A high-level Indian delegation comprising defense scientists and Indian Air Force (IAF) officers visits Israel to purchase ground-based and airborne electronic warfare (EW) equipment that can potentially neutralize Pakistani air defenses around the Kahuta uranium enrichment facility. Israel reportedly provides India with technical details about F-16s in possession of the Pakistani Air Force; the aircraft's radar frequencies, and techniques to jam them, in exchange for performance details on MiG-23 combat aircraft, in service with the IAF.

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—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 346.

February 1983

India's Department of Atomic Energy (DAE) expresses exasperation at the US government's failure to approve licenses for spare parts for the Tarapur reactors. The Director of DAE's power projects engineering division says his department is reconditioning some items and trying to find substitutes for others. The parts include pump seals from Byron Jackson, valves from Rockwell, and neutron sensing devices from General Electric.

—"Because of US Failure To Approve Licenses For Some Much Needed...," *Nucleonics Week*, 24 February 1983, p. 4.

14 February 1983

Bhabha Atomic Research Center's (BARC) Director Raja Ramanna tells *Nuclear Fuel* that India has begun reprocessing commercial spent nuclear fuel, from Unit 1 of the 220MW Rajasthan Atomic Power Station (RAPP-1) at the Tarapur nuclear fuel reprocessing facility. The Tarapur nuclear fuel reprocessing facility has the capacity of reprocessing 100 tons of spent fuel annually. Ramanna says, "We started about two months ago. The International Atomic Energy Agency (IAEA) inspectors are there watching." Asked if the Tarapur reprocessing facility will also reprocess fuel from the US-built Tarapur nuclear reactor, Ramanna says that would depend on political interpretations of various agreements. "We here are only dealing with installation of the facilities and their utilization. If they (India government officials) say reprocess, we'll reprocess. We can do it. At the moment we are busy with the RAPS fuel," he says.

The Tarapur reprocessing facility has been inactive since 1976 because of a disagreement between the India and the United States about the "joint determination" of spent fuel from the US-built 210MW Tarapur reactors. In December 1980, Indian officials announced that "subsidiary arrangements" were made with the IAEA to allow reprocessing of spent nuclear fuel; but the United States denied it had resigned its right to joint determination. In 1981, India announced that it had begun shipping RAPP-1 fuel for reprocessing and that it would soon be followed with spent fuel from the Tarapur nuclear power plant. However, India delayed reprocessing until now in order to resolve the US-India dispute over the 1963 Tarapur agreement.

Constructed in 1976, the Tarapur fuel reprocessing center was originally constructed to reprocess fuel from the RAPP-1 and RAPP-2 reactors, as well as the Tarapur nuclear power plant. It is "designed to use the chop leach method at the head end followed by dissolution, solvent extraction, separation of fission products, purification, of separate plutonium and residual uranium, and conversion to oxide forms."

—Pearl Marshal, "India Reprocesses Rapp Fuel under IAEA Eyes," *Nuclear Fuel*, 14 February 1983, pp. 12-13.

20 February 1983

The *New York Times* reports that India has commenced producing weapons-grade plutonium at the Tarapur nuclear fuel reprocessing facility near Bombay. The operation is being monitored by International Atomic Energy Agency (IAEA) inspectors under an agreement with the United States, Canada, and France. However, India may refuse to allow the reprocessing operation to be placed under "full-scope safeguards" in the future. An Indian

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embassy source in Washington, DC says the reprocessing is experimental. He adds, "We are not aware of any large-scale processing by India, and in any event India has no intention of making the bomb." India contends that any plutonium obtained from reprocessing will either go into a fast breeder reactor or into civilian use.

—Clyde H. Farnsworth, "Indian Plant Now Producing Weapons-Grade Plutonium," *New York Times*, 21 February 1983 p. A4; in Lexis-Nexis Academic Universe, 21 February 1983, <http://web.lexis-nexis.com>.

24 February 1983

India announces the establishment of the Institute of Modern Technology (IMT) at Indore in Madhya Pradesh. According to a spokesperson from the Bhabha Atomic Research Center (BARC), the IMT will be half the size of BARC can focus on fusion research. He states, "There is some activity (in India) on the theory side on tokamaks and lasers, but now it is time to concentrate on some of these lines. Things are getting close and we shouldn't be left out. IMT is scheduled to be complete in three years."

—Fusion Research is to be Given a Boost in India..., " *Nucleonics Week*, 24 February 1983, p. 4.

25 February 1983

Prime Minister Indira Gandhi accuses Pakistan of "covertly attempting to make nuclear weapons." She says, "One doesn't know what President Zia wants or what his intentions are, or what you can discuss, if from what we hear he has made up his mind to acquire nuclear capability which is not for peaceful purposes, what can you discuss." Gandhi is scheduled to meet Zia at the nonaligned summit in New Delhi in less than two weeks.

—Alain Cass and John Elliot, "India Fears Pakistan Nuclear Intentions," *Financial Times* (London), 25 February 1983, p. 14; in Lexis-Nexis Academic Universe, 25 February 1983, <http://web.lexis-nexis.com>.

28 February 1983

Raja Ramanna, director of the Bhabha Atomic Research Center (BARC), announces that India is currently engaged in developing uranium enrichment capability on a laboratory scale. In response to a question whether it was a "lab scale centrifuge enrichment or laser project," Ramanna says, "All types - lasers, things like that. Lasers, after all, are useful for so many things. But it's one thing to produce enriched uranium in a laboratory and quite another to produce it in a factory." In an interview with *Nuclear Fuel*, Ramanna stresses that the enrichment project was on a small scale and for research purposes only.

—"India Is Pursuing Uranium Enrichment Technology," *Nuclear Fuel*, 28 February 1983, pp. 3-4.

28 February 1983

The Director of Bhabha Atomic Research Center (BARC) Raja Ramanna says that India will not attempt to acquire highly enriched uranium from France to fuel India's 15MW, sodium-cooled Fast Breeder Test Reactor (FBTR) at Kalpakkam, near Madras. As an alternative to the traditionally used highly enriched uranium fuel, India intends to use its advanced plutonium-based mixed-carbide fuel. Plutonium-based mixed-carbide fuel has been explored as an alternative fuel in the West for 15 years, but India will be the first to use it "as a full core," says Ramanna. Until now, India's mixed-carbide fuel has only been tested on a laboratory scale; however, final testing can only take place within an operating FBTR. Ramanna admits, "there's a certain amount of risk in it, but from every point of view it looks very promising. Only next year will we be able to tell you how it works." India favors mixed-carbide

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fuel because of its better breeding ratio. Rather than taking 30 years to commission a second nuclear reactor on the fuel bred from the first one, Ramanna feels India's program can reduce the "doubling time" to 15 years.

Ramanna does not give further details about the mixed-carbide fuel. However, some Western observers believe the plutonium for the fuel was supplied by the Canadian-built CIRUS heavy water reactor in operation since 1964 at Trombay. Experts estimate that CIRUS could have yielded 50kg of plutonium from 1964-74 and later increased to 10kg year. India currently has only two commercial pressurized heavy water reactors (PHWRs) that can supply the FBTR with plutonium, both located in Rajasthan. However, the spent fuel from Unit 1 of the Rajasthan Atomic Power Plant (RAPP-1) is under International Atomic Energy Association (IAEA) safeguards "in perpetuity" because the plant uses imported heavy water. Therefore, plutonium from RAPP-1 will not be used in India's FBTR program. India has recently proven its PHWR spent fuel reprocessing capability by beginning to reprocess spent fuel from the RAPP-1 at the Tarapur reprocessing facility. Furthermore, India plans to protect future PHWRs from international safeguards by using indigenously produced materials.

Although the overall design of India's FBTR is based on the French example, with some of the smaller components purchased from France, the majority of components have been produced by Indian manufacturers. The reactor vessel, the intermediate heat exchangers, the steam generators and the sodium pumps were manufactured by Bharat Heavy Electrical Ltd. and Bharat Heavy Plate & Vessel Ltd. The majority of the instrumentation and control systems were designed and constructed by the Electronics Corporation of India Ltd.

The experience gained from the FBTR, in terms of material behavior, sodium cooling, pumps and electronics operations, will be channeled into the final design of the prototype 500MW fast breeder reactor (FBR) proposed to be built at Kalpakkam. "Each is being done separately and integrated. We have to take into account that all these components must be capable of being made in India, although there will be some raw material imports such as special steel alloys. This is being done for the FBTR so I do not see why it cannot be done for the FBR," says Ramanna. When India commissions the FBTR at Kalpakkam, it will enter the second phase of its nuclear development program, "breeding with plutonium generated and accumulated in its first stage - the pressurized heavy water reactors (PHWRs)." Western observers believe India's "enthusiasm" for an FBR program is to disguise its embryonic weapons program. With limited international safeguards on its nuclear plants, India could be producing 600kg of plutonium annually by the early 1990s, more than adequate to produce up to 60 nuclear bombs a year.

—Pearl Marshall, "India Will Run FBTR with Mixed-Carbide Fuel Next Year - Probably with Cirus Plutonium," *Nuclear Fuel*, 28 February 1983, pp. 9-11.

March 1983

Israeli electronic warfare (EW) equipment is secretly ferried to the Indian Air Force (IAF) base in Jamnagar in Gujarat.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 346.

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24 March 1983

Indian Minister of State for Science and Technology Shivraj Patil tells parliament that India is estimated to have 67,000 tons of uranium ore reserves, which is sufficient to meet India's nuclear fuel needs. India's current annual requirement of uranium is 213 tons.

—"Uranium Reserves," New Delhi Home Service, BBC Summary of World Broadcasts, 24 March 1983; in Lexis-Nexis Academic Universe, 30 March 1983, <http://web.lexis-nexis.com>.

25 March 1983

India and France sign an agreement on the supply of enriched uranium for the US-built nuclear power plant at Tarapur in Maharashtra. The agreement is signed by Cogema, a subsidiary of the French Atomic Energy Commission, and India's Atomic Energy Commission (AEC). The agreement is finalized only after France agrees to "waive the safeguards stipulated by the London Nuclear Club, which require members to insist on what are known as 'pursuit' and 'perpetuity' clauses," the *Financial Times* reports. The "pursuit" clause provides for international supervision of the reprocessing of spent fuel, while the "perpetuity" clause calls for international supervision of all nuclear power facilities.

—K.K. Sharma, "India and France Conclude N-Supply Deal," *Financial Times* (London), 25 March 1983, p. 14; in Lexis-Nexis Academic Universe, 25 March 1983, <http://web.lexis-nexis.com>.

30 March 1983

India's Minister of State for Atomic Shivraj Patil reports to parliament that work has begun on building two new heavy water facilities at Pal in Maharashtra and Manuguru in Andhra Pradesh. He also states the heavy water plant at Kota, with an installed annual capacity of 100 tons, will be commissioned by the middle of the year. Finally, he confirms the first unit of the Madras Atomic Power Station (MAPS) is expected to be commissioned this year, and the second unit in 1984-85.

—"Heavy Water Plants," New Delhi Home Service, BBC Summary of World Broadcasts, 30 March 1983; in Lexis-Nexis Academic Universe, 6 April 1983, <http://web.lexis-nexis.com>.

21 April 1983

During a parliament briefing, Indian Prime Minister Gandhi reports India has received a total of 547.6 tons of heavy water from the Soviet Union at a cost of about \$85 million. According to public documents, India has only obtained heavy water from the Soviet Union on two occasions. The first occasion was in September 1976 when India purchased 200 tons of heavy water. As a supplement to the first agreement, India purchased an additional 256 tons in March 1980, of which 125 tons have yet to be delivered. This is the first time India has disclosed that it imported an additional 216 tons of heavy water from the Soviet Union than was revealed publicly. In October 1982, the Indian Parliament was told India's heavy water requirement for fiscal year 1982-93 was 426 tons. At the same time, India reported it had produced 124 tons of heavy water domestically. However, in 1981, India had only produced 39.4 tons of heavy water, leaving many observers skeptical of how India could have made up for the shortfall in heavy water production.

—"India Apparently Imported More Heavy Water from the USSR than it has Said...," *Nucleonics Weeks*, 21 April 1983, p. 8.

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7 May 1983

The first shipment of enriched uranium from France arrives in Hyderabad by a chartered Air India cargo flight. The seven barrels of 2,500kg each of enriched uranium will be sent to the US-built Tarapur nuclear power station which has been running about half of its 420MW capacity for more than two years.

—"India Gets Atomic Fuel from France," Xinhua (Beijing), 7 May 1993; in Lexis-Nexis Academic Universe, 7 May 1983, <http://web.lexis-nexis.com>.

9 May 1983

Indian Minister for Science, Technology & Atomic Energy, Shivraj Patil, announces the nuclear fuel reprocessing plant at Trombay is ready for recommissioning. The plant was originally decommissioned in 1972 in order to expand its reprocessing capacity and increase the plant's life. The Indian Department of Atomic Energy (DAE) says the plant's increased reprocessing capacity will permit it to reprocess spent fuel from the R-5 or Dhruva research reactor expected to be commissioned in 1984.

—"The Reprocessing Plants at Trombay is Ready for Recommissioning," *Nuclear Fuel*, 9 May 1983, p. 7.

25 May 1983

The *Hindustan Times* reports that India has received a "secret nuclear consignment" from the Soviet Union. "Top secret consignment boxes, possibly containing enriched uranium" were offloaded from a Soviet Aeroflot Jet and placed on trucks bound for the Anushakti Atomic Power Project, Kota, Rajasthan. However, the Indian foreign ministry, while denying the enriched uranium shipment story, admits that India has received a consignment of heavy water. The spokesperson says that the Soviet Union has supplied 131 tons of heavy water out of the total of 256 tons, which it agreed to supply under a protocol signed in 1979.

—"Soviet Nuclear Consignment Arrives in India," Xinhua (Beijing), 25 May 1983; in Lexis-Nexis Academic Universe, 25 May 1983, <http://web.lexis-nexis.com>; "Arrival of Soviet Uranium in India Denied," Xinhua (Beijing), 25 May 1983; in Lexis-Nexis Academic Universe, 25 May 1983, <http://web.lexis-nexis.com>.

June 1983

The chiefs of India's armed services submit a joint letter to the defense minister outlining their case for a nuclear deterrent. Chief of Army Staff General Krishna Rao also makes the case for nuclear weapons in person to Prime Minister Indira Gandhi. However, the prime minister remains unpersuaded and cites economic constraints behind her decision not to test.

—Raj Chengappa, "Arsenal For The Gods," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 286-287.

30 June 1983

Citing safety concerns, US Secretary of State George Shultz tells Indian foreign minister P.V. Narashima Rao that the United States "is prepared to take the necessary actions to supply those parts which are not available from elsewhere." India hopes to obtain the spare parts, such as pump seals and valves, from sources outside the United States. These sources would likely be Italy or France. Under the US Nonproliferation Act of 1978, the United States is forbidden to supply nuclear related materials to countries that refuse full-scope international safeguards.

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—Philip Taubman, "Schultz Tells India That US will Drop Reactor Parts Ban," *New York Times*, 1 July 1983, p. A4; in Lexis-Nexis Academic Universe, 1 July 1983, <http://web.lexis-nexis.com>.

23 July 1983

Indian Prime Minister Indira Gandhi starts up the first unit of India's first domestically designed and built nuclear power plant at Kalpakkam, 60 miles south of Madras. As India's third nuclear plant, the Kalpakkam nuclear power facility is composed of two units, "each capable of producing 235MW of power." The second unit is expected to become operational in 18 months. The nuclear reactors at Kalpakkam will not be subject to international safeguards. While dedicating the nuclear power plant, Gandhi says, "India desires to make deserts bloom and not make cities deserts." She adds, "India has no intention to embark on a nuclear weapons program. India did not sign the Nuclear Non-Proliferation Treaty (NPT) because the nuclear weapons powers have not stopped production of nuclear weapons, and because the treaty is discriminatory against non-nuclear powers."

—S.G. Roy, "Gandhi Dedicated Nuclear Plant, Promised Peaceful Goals," UPI, 23 July 1983; in Lexis-Nexis Academic Universe, 23 July 1983, <http://web.lexis-nexis.com>.

25 July 1983

One of the two reactors at the US-built Tarapur nuclear power plant is shut down for repairs following a leak in a circulation pump. Indian officials attribute the leak to worn-out parts and blame the United States for holding up the sales of spares for the plant.

—"Reactor at Indian Atom Plant Built by US is Closed Down," *New York Times*, 26 July 1983, p. A8; in Lexis-Nexis Academic Universe, 26 July 1983, <http://web.lexis-nexis.com>.

Mid or Late 1983

Prime Minister Indira Gandhi reportedly asks the Chief of Air Staff Air Marshall Dilbagh Singh to ready a strike mission against Pakistan's nuclear weapon-related facilities. In anticipation of the final strike order from New Delhi, earmarked Indian Air Force (IAF) Jaguar squadrons begin practicing low-level routing as well as approach-to-target and toss-bombing techniques with 1,000-2,000lbs bombs. The IAF plan calls for intense air activity along the western border and decoy runs to "spoof" and distract the Pakistani Air Force (PAF).

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 346-347.

11 August 1983

In an address to parliament, Prime Minister Indira Gandhi rules out "any atomic test for peaceful purposes like the one held at Pokhran in 1974." She also says her government is considering setting up more nuclear power plants in addition to the six already approved for the Seventh Five-Year Plan, and the needs of India's eastern region will be taken into account.

—"Mrs. Gandhi Rules out Nuclear Tests," New Delhi Home Service, BBC Summary of World Broadcasts, 11 August 1983; in Lexis-Nexis Academic Universe, 15 August 1983, <http://web.lexis-nexis.com>.

Post-August 1983

Pakistan's Atomic Energy Commission (AEC) Chairman, Munir Ahmed Khan, and Indian AEC Chairman, Dr. Raja

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Ramanna, meet at Imperial Hotel in Vienna where both are attending an International Atomic Energy Agency (IAEA) meeting. Khan warns Ramanna of the potential dangers of a joint Indo-Israeli attack on Pakistan's nuclear facilities at PINSTECH and Kahuta. While disclaiming that he is negotiating on behalf of the Pakistani government, Khan warns that Pakistan will retaliate against Indian nuclear facilities in Trombay, which would probably result in the release of "...massive amounts of radiation to a large populated area causing a disaster." In response, Ramanna assures Khan that he will discuss the matter with Indian Prime Minister Indira Gandhi.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 241.

7 September 1983

India's Atomic Energy Commission's (AEC) Chairman Dr. Raja Ramanna requests the Gandhi government to invest 1.5 billion rupees (about \$987 million) in India's nuclear energy program. The AEC has refocused its nuclear power generation priorities to the use of pressurized heavy water reactor technology, natural uranium as fuel, and heavy water as a coolant. Ramanna suggests an advanced commitment by the government would "enable the nuclear power industry to plan its production and help cut costs." All planned nuclear power projects in the next few years will consist of standardized 235MW power reactors. India's first fast breeder test reactor at Kalpakkam and the R5 research reactor at the Bhabha Atomic Research Center (BARC) in Trombay are expected to become operational in 1984.

—R.C. Murthy, "India's N-Plant Chief Seeks Extra Cash," *Financial Times* (London), 7 September 1983, p. 14; in Lexis-Nexis Academic Universe, 7 September 1983, <http://web.lexis-nexis.com>.

18 September 1983

During the opening speech of the 12th World Energy Conference in New Delhi, Prime Minister Indira Gandhi gives a brief assessment of India's nuclear program. Gandhi says India's decision to acquire nuclear power "aroused opposition from many countries, who accused us of imprudence and impracticality. The opposition continues and we are obstructed at every step. But Indian technology has acquired the capacity to design, fabricate and build nuclear power stations....I hope you are all aware that our nuclear program is prompted not by military objectives but by developmental necessity. It is dedicated to agriculture, medicine and meeting our energy needs. We are opposed to nuclear weapons and do not have any," she says.

During the course of the conference, other Indian government officials present papers that provide some insight on the current status of India's nuclear program and its possible future direction. For example, one paper by the Indian Department of Atomic Energy (DAE) views an immediate switch to 500MW pressurized heavy water units as unfeasible because of India's limited capacity to manufacture larger reactor components. The paper also states that India might deviate from its current nuclear power plan—building 235MW breeder reactors and developing a thorium fuel cycle—by considering obtaining from abroad pressurized water type (PWR) reactors on a limited basis, provided the terms are acceptable to New Delhi. The DAE also indicates its willingness to supply heavy water reactors to other developing countries at some point in the future.

—Richard S. Ehrlich, "Indian Prime Minister: We have no A-bombs," UPI, 18 September 1983; in Lexis-Nexis Academic Universe, 18 September 1983, <http://web.lexis-nexis.com>; Rob Laufer, "USSR, India Outline Their Nuclear Programs at World Energy Conference," *Nucleonics Week*, 22 September 1983, pp. 8-9.

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6 October 1983

India and West Germany exchange a "verbal note" under which India agrees to abide by international nuclear safeguards at the Tarapur Atomic Power Station (TAPS) in exchange for German spare parts for the facility. The understanding is expected to pave the way for India to purchase spare parts from the German company Kraft Werke Union for the Tarapur plant.

—Neal Robbins, "India, West Germany Agree on Nuclear Plant," UPI, 1 November 1983; in Lexis-Nexis Academic Universe, 1 November 1983, <http://web.lexis-nexis.com>.

24 October 1983

The Indian Department of Atomic Energy (DAE) says that several significant uranium deposits have been detected in Karnataka, Madhya Pradesh, Bihar and Andhra Pradesh; detailed investigations are being conducted to assess their economic viability.

—"India Discovers Uranium," Xinhua (Beijing), 24 October 1983; in Lexis-Nexis Academic Universe, 24 October 1983, <http://web.lexis-nexis.com>.

7 December 1983

Responding to questions from parliament, Indian defense minister R. Venkataraman suggests that the Indian government might decide to purchase a nuclear submarine. While listing the recent purchases being made by India in Western Europe and the Soviet Union, he says, "We (India) might go in to for a nuclear powered submarine also."

—John Elliott, "India 'May buy Nuclear Submarine'," *Financial Times* (London), 7 December 1983, p. 4; in Lexis-Nexis Academic Universe, 7 December 1983, <http://web.lexis-nexis.com>.

13 December 1983

The French Minister for Industry and Research Laurent Fabius says France is prepared to provide uranium fuel for the fast breeder reactor under construction at the Madras nuclear power station (MAPS). However, Prime Minister Indira Gandhi tells parliament that "India has developed its own indigenous fuel for the fast breeder test reactor; therefore it has no need to get fuel from France."

—"Uranium Reserves Discovered in India," Xinhua (Beijing), 14 December 1983; in Lexis-Nexis Academic Universe, 14 December 1983; <http://web.lexis-nexis.com>.

14 December 1983

Shivraj Patil, Minister of State for Science and Technology, tells parliament that about 73,000 tons of uranium reserves have been discovered throughout India. Also, he says, this additional uranium discovery will enable India's nuclear program to reach an installed capacity of 10,000MW by the year 2000.

—"Uranium Reserves Discovered in India," Xinhua (Beijing), 14 December 1983; in Lexis-Nexis Academic Universe, 14 December 1983; <http://web.lexis-nexis.com>.

Late 1983

US intelligence reportedly learns about Indian attack plans on Pakistani nuclear facilities and alerts Islamabad. Indian intelligence subsequently picks up signs of changes in the alert status of the Pakistani Air Force, and possibly

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plans to attack Indian nuclear facilities in Trombay. Fearing the potential radioactive damage from a Pakistani retaliatory strike, Prime Minister Indira Gandhi shelve plans for a pre-emptive attack.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), pp. 347-348.

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1982

1982

Indian nuclear scientists at the Bhabha Atomic Research Center (BARC) reportedly develop an improved version of the nuclear device tested in 1974. The redesigned device weighs between 170-200kg and incorporates more reliable neutron initiators, better conventional high-explosive lenses, improved electronics, and other design changes to reduce the size and weight, and increase yield. Although the device's individual sub-subsystems are tested under laboratory conditions, the scientists make the case for full-scale explosive testing.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 242.

15 January 1982

In an interview with the *Financial Times*, Pakistani Foreign Minister Agha Shahi confirms that Pakistan did not give any assurances to Washington about not "detonating a nuclear device" in return for the recently ratified \$3.2 billion arms and economic aid package from the United States. Shahi says, "We have given no assurances of any kind to the United States with regard to our nuclear program." However, he adds, that Pakistan understands the position of the US Congress. "The US has made its position clear and we have understood it. Whether we explode a nuclear device will be a decision Pakistan will take knowing the consequences," Shahi says. Finally he repeats that Pakistan has no intention of constructing nuclear weapons. "We make a distinction between an explosion and weapons," he says. "We do not rule out the possibility of a detonation if it is necessary for our program."

—Alain Cass, "Pakistan Denies Giving Pledge on N-Testing," *Financial Times* (London), 15 January 1982; in Lexis-Nexis Academic Universe, 15 January 1982, <http://web.lexis-nexis.com>.

20 January 1982

Unit 2 of the Rajasthan Atomic Power Station (RAPS-2) is shut down because of erosion caused by excess moisture in the turbine. The turbines might take some six months to replace; and the moisture problem might take one year to resolve. A similar problem plagued Unit 1 in 1973-74. One report calculates that Unit 1 averaged a shut-down every 13 days; the figure for Unit 2 was 19 days. Apparently, the two units of RAPS have an operating record "in the lower 10 percent of the world's reactors."

—"Both Units of India's Rajasthan Nuclear Plant Have Been Shut Down," *Nucleonics Week*, 8 April 1982, p. 10.

13 February 1982

Delivering a speech to the National Productivity Council Federation, Chairman of India's Atomic Energy Commission (AEC), Dr. H.N. Sethna says, "Despite shortcomings, India has acquired its own nuclear high

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technology. This has made it possible to launch a fast reactor program based on plutonium." Also, according to a spokesman from the Department of Atomic Energy (DAE), work has begun on India's fifth nuclear power station. Located in Gujarat, the station will consist of four 235MW units fueled by natural uranium and moderated by heavy water. The fuel for the project will be supplied by the Nuclear Fuel Complex (NFC) in Hyderabad. The first unit is expected to come online in nine years.

—"Energy: Nuclear Power," New Delhi Home Service, BBC Summary of World Broadcasts, 13 February 1982; in Lexis-Nexis Academic Universe, 24 February 1982, <http://web.lexis-nexis.com>.

15 February 1982

When questioned about what India's response might be were Pakistan to develop a nuclear capability, Indian Prime Minister Indira Gandhi replies, "...I don't think that I can give a categorical answer and bind the Indian government to any position. As I say, I don't think, even if Pakistan does something like this, that we should do it. But it's not right for me to make any kind of categorical statement on it." Gandhi claims that Pakistan is on the verge of developing a nuclear capability. However, she downplays the idea that India might intervene to prevent Pakistan from acquiring a nuclear bomb.

—"India's Gandhi Tells Why She is Sour on US," *US News & World Report*, 15 February 1982; in Lexis-Nexis Academic Universe, 15 February 1982, <http://web.lexis-nexis.com>.

19 February 1982

When asked if Pakistan was acquiring fissile material or making nuclear weapons, Defense Minister Venkataraman tells the Lok Sabha (upper house of parliament) that New Delhi "hopes Pakistan would abide by its assurances that its nuclear program has no non-peaceful dimensions."

—"Indian Defense Minister on Pakistan's Nuclear Program," New Delhi Home Service, BBC Summary of World Broadcasts, 19 February 1982; in Lexis-Nexis Academic Universe, 24 February 1982, <http://web.lexis-nexis.com>.

February 1982

India is reported to likely delay commissioning of the first unit of the Madras Atomic Power Plant (MAPP-1) at Kalpakkam near Madras for an unspecified amount of time because of a short fall in heavy water. New Delhi is currently deciding whether to purchase more heavy water from the Soviet Union, which would require placing MAPP-1 under international safeguards, or wait for its domestic heavy water capacity to increase. The reactor will require 240-250 tons of heavy water, but according to G.K. Reddy, a political observer, only 35 tons are currently available. Indian officials have not confirmed these figures. Although India has previously contracted 456 tons of heavy water from the Soviet Union, it intends to keep Units 1 and 2 of MAPP free from international safeguards. As part of the MAPP-1 and MAPP-2 fuel cycle, India is constructing its third spent-fuel reprocessing plant, with a 100 ton-per-year capacity, in the vicinity of the MAPP units. Not only will this plant reprocess spent fuel from the MAPP facility, but also be able to reprocess fuel from the 15MW fast breeder test reactor (FBTR) at Kalpakkam.

Apparently, heavy water production is the only area left in India's commercial nuclear power program where it is unable to "solve the technical constraints and become self-reliant." India currently has four heavy water production facilities:

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Nangal in the Punjab, with a capacity of 14 tons per year (being expanded to 21 tons per year), was commissioned in 1962 and supplies the Cirus research reactor with over half its heavy water output. The Nangal facility is India's only reliable heavy water facility.

Baroda in Gujarat, with a capacity of 67 tons per year, began producing heavy water in July 1980 after a fire and explosion in December 1977 closed the plant. The Baroda facility still faces numerous operational and technical problems, as well as lack of feeder stock and a reliable power supply.

Tuticorin in Tamil Nadu, with a capacity of 71 tons per year, was commissioned in mid-1978; the facility has "faced a number of operational problems, including technical difficulties, lack of feeder stock and power constraints."

Kota in Rajasthan, with a capacity of 100 tons/year, will be commissioned later during 1982. A Department of Atomic Energy (DAE) spokesperson says the performance of the facility has been "satisfactory."

DAE's Heavy Water Division Director N. Srinivasan says India is planning to construct 10 additional heavy water production facilities by the year 2000. In order to meet its target of an installed nuclear generating capacity of 10,000MW by the turn of the century, India will need to produce 13,000 tons of heavy water. At present, three of the 10 plants are in different stages of approval:

Thal Vaishet in Maharashtra State is connected with a fertilizer project and is expected to have a capacity of 70-85 tons per year. The plant will be based on an ammonia/hydrogen monothermal exchange process.

Hazira in Gujarat State is similar to the Thal Vaishet facility in that it is also connected with a fertilizer project and is expected to have a capacity of 70-85 tons per year. The plant will also be based on an ammonia/ hydrogen monothermal exchange process. However, the project "has been deferred for some time," says a DAE spokesperson.

Manuguru in Andhra Pradesh will be modeled on the Kota facility; its annual production capacity is expected to be 200 tons, double that of the Kota facility. The Manuguru plant will be based on the hydrogen sulfide-water bithermal exchange process.

—"India, Wanting No Constraints, Loath to Seek Heavy Water From Soviet," *Nucleonics Week*, 18 February 1982, pp. 4-5.

5-6 March 1982

India's Department of Atomic Energy (DAE) sends a senior official to the Nuclear Fuel Complex (NFC), Hyderabad, to investigate charges of illegal dumping of hazardous material outside its plant. The illegal dumping allegedly caused a fire that fatally burned two children who were in the area. The *Indian Express* reports that a preliminary police investigation "has revealed that potentially dangerous waste material was regularly being dumped by the NFC on open ground with no fencing or warning signs." A NFC safety manager reportedly told police that the NPC only disposes non-combustible magnesium chloride on the open dumping ground, but later "admittedly reluctantly" that zirconium power might have been mixed with the waste material. DAE officials state that the

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children did not come into contact with any radioactive material and that the accident occurred on the boundary of the complex, "beyond the protected area." The NFC maintains it only uses the area for dumping non-combustible materials, specifically magnesium chloride. Last March a similar accident occurred resulting in three deaths and several injuries.

—"India Probes Fatal Fire near Waste Dump," *Nuclear Fuel*, 15 March 1982, p. 17; "India's Department of Atomic Energy has Concluded...", *Nuclear Fuel*, 9 March 1982, p. 17.

6 March 1982

Unit 1 of the Rajasthan Atomic Power Station (RAPS-1) is shut down because of leaks in the moderator and the heat exchangers and the end shroud of the reactor. Although replacing the heat exchangers is not expected to take long, the shutdown could become more prolonged depending on the duration of other problems. According to one calculation, Unit 1 of the plant has averaged a shutdown every 13 days during the nine years of its operation. A Western observer remarks that the problems are not endemic to the Canadian-supplied CANDU reactors and can be fixed with the "...right metallurgy, good welding, and proper water treatment."

—"Both Units of India's Rajasthan Nuclear Plant Have Been Shut Down," *Nucleonics Week*, 8 April 1982, p. 10.

7 March 1982

Sources at the Atomic Energy Commission (AEC) confirm that two more 235MW units will be added to the Narora Atomic Power Complex in Uttar Pradesh. A total of six nuclear power units are planned for the Sixth Five-Year Plan (1978-83). A committee is currently evaluating locations in Assam for a two unit nuclear power plant.

—"Energy: Nuclear Power," New Delhi Home Service, BBC Summary of World Broadcasts, 7 March 1982; in Lexis-Nexis Academic Universe, 17 March 1982, <http://web.lexis-nexis.com>.

16 April 1982

The Indian Department of Atomic Energy (DAE) releases a report to parliament stating that construction on India's fifth nuclear power station has started. The station is located at Kakrapar in Gujarat state; it will have two 235MW reactors. The report also states that "preparations are on to start reprocessing of power reactor fuel at the reprocessing plant in Tarapur to recover plutonium." The report says the plutonium produced would be of fuel grade. However, an Indian nuclear scientist says the reprocessing plant is designed to produce both weapons-grade or fuel-grade plutonium, depending on what the government wants. The reprocessing plant is located near the US-built Tarapur nuclear power plant, which is fueled by US-supplied uranium. The United States halted uranium fuel shipments in 1981 because of India's refusal to accept Washington's conditions for international safeguards on all its nuclear power plants." Trial runs at the Tarapur reprocessing plant were conducted for several months during 1981 and a few spent fuel rods from the Rajasthan Atomic Power Station (RAPS) have been sent to the plant to start operations.

—"India Builds New Atomic Power Stations," Xinhua (Beijing), 16 April 1982; in Lexis-Nexis Academic Universe, 16 April 1982, <http://web.lexis-nexis.com>; S.G. Roy, "India is Preparing...", UPI, 16 April 1982; in Lexis-Nexis Academic Universe, 16 April 1982, <http://web.lexis-nexis.com>; "India to Start Producing Plutonium," *New York Times*, 17 April 1982, p. 5; in Lexis-Nexis Academic Universe, 17 April 1982, <http://web.lexis-nexis.com>.

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March-April 1982

Admiral Dawson, who succeeds Pereira as the Naval Chief of Staff, also opposes the nuclear submarine project. A team of naval designers led by Captain Subbarao persuades Dawson to reject the Bhabha Atomic Research Center's (BARC) nuclear reactor design in favor of the one designed by naval engineers. In subsequent meetings with defense minister R. Venkataraman, Dawson opposes suggestions to get Soviet assistance in the design of a nuclear reactor and complains that the Navy is not being kept abreast of the Soviet proposal. Dawson is also supported by BARC, which views the Soviet offer as a ploy to undermine indigenous efforts. However, Venkataraman overrules Dawson and informs him that the government has decided to seek Soviet assistance.

—Raj Chengappa, "Arsenal For The Gods," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 287-288.

19 April 1982

During a meeting with Japanese foreign minister Yoshio Sakurauchi, India's foreign minister P.V. Narashima Rao reiterates that India will not sign the Nonproliferation Treaty (NPT) because it believes the treaty "discriminates between nuclear powers and non-nuclear countries." However, Rao says India will continue to work with Japan in "advancing disarmament."

—"India Not to Join the NPT, Rao Tells Sakurauchi," Jili Press Service (Tokyo), 19 April 1982; in Lexis-Nexis Academic Universe, 19 April 1982, <http://web.lexis-nexis.com>

21 April 1982

India plans to construct two additional heavy water plants to end the chronic heavy water shortages in its nuclear industry. The new plants will be built using indigenous technology and resources. India declined Soviet offers to supply heavy water because the latter insisted that any plants using their heavy water would have to be subject to international safeguards.

—Alain Cass, "Delhi to Build Two Heavy Water Plants for N-Power Stations," *Financial Times* (London), 21 April 1982; in Lexis-Nexis Academic Universe, 21 April 1982, <http://web.lexis-nexis.com>.

2 May 1982

The Chairman of India's Atomic Energy Commission (AEC), Dr. H.N. Sethna announces that a heavy water plant will be constructed on the banks of the Godavari River in Andhra Pradesh.

—"Nuclear Power," New Delhi Home Service, BBC Summary of World Broadcasts, 2 May 1982; in Lexis-Nexis Academic Universe, 12 May 1982, <http://web.lexis-nexis.com>.

6 May 1982

During a private meeting with Prime Minister Indira Gandhi, Chief of Army Staff General Krishna Rao makes the case for an Indian nuclear deterrent. Rao cites potential nuclear threats from Pakistan, China, and the United States to buttress his case; he also briefs the prime minister on the contents of a top-secret 1976 Army report that made the case for an Indian nuclear deterrent. The prime minister tells Rao that she will inform him of her decision in the course of a few weeks.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 253-255.

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6 May 1982

Prime Minister Indira Gandhi denies that the Kota nuclear power station in Rajasthan is having numerous breakdowns. She says, "There is no waste of heavy water in the plant...The make-up requirements of heavy water have been well within limits." The Minister of State for Science and Technology C.P.N. Singh informs parliament "that there is no need to import heavy water for atomic reactors." India is currently producing heavy water at Baroda and Tuticorin and will start producing heavy water at the Talcher and Kota plants in the near future. —"Nuclear Energy," New Delhi Home Service, BBC Summary of World Broadcasts, 6 May 1982; in Lexis-Nexis Academic Universe, 16 June 1982, <http://web.lexis-nexis.com>.

13 May 1982

Minister of State for Science and Technology C.P.N. Singh tells parliament that the Department of Atomic Energy (DAE) will establish a second nuclear research facility in Madhya Pradesh to relieve overcrowding at the Bhabha Atomic Research Center (BARC) at Trombay. Singh also reports that New Delhi still expects to use indigenously produced heavy water for the Unit 1 of the proposed Madras Atomic Power Plant (MAPP). Singh does not provide details on when Mapp-1 will become operational. The Mapp-1 reactor requires 240-250 tons of heavy water, but unofficial estimates of heavy water availability are between 60 to 120 tons.

—India's Department of Atomic Energy will Establish a Second..., " *Nucleonics Week*, 13 May 1983, p. 9.

May 1982

US Undersecretary of State for Political Affairs Lawrence Eagleburger confronts visiting Indian foreign secretary M. Rasgotra with photographic evidence of India's efforts to build nuclear test shafts at Pokhran and demands an explanation. Rasgotra, who is evidently unaware of the activities, denies knowledge of any impending tests. On his return to India, Rasgotra briefs Prime Minister Indira Gandhi about his visit and warns that a nuclear test will have negative repercussions for India.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 256-257.

27 May 1982

India Atomic Energy Commission (AEC) Chairman Homi Sethna inaugurates the new Nuclear Plant & Equipment Division to be operated by the Association of Indian Engineering Industry, which represents more than 1,500 Indian engineering companies. The primary purpose of the new division is to "promote indigenization" of nuclear plant and equipment production. "The DAE's highly ambitious targets call for massive collective efforts and a tremendous resource mobilization both on the part of the department and the part of industry," says T.S. Champaknath, chairman of the Nuclear Plant & Equipment Division.

—"Calling for Industry to Gear Itself up to Help India Achieve...", " *Nucleonics Week*, 27 May 1982, pp. 6-7.

2 July 1982

Indian Prime Minister Indira Gandhi reports that the technical problems responsible for the delays in heavy water production at the Kota heavy water plant have been identified and are being rectified; the plant is expected to start producing reactor-grade heavy water by the end of 1982. The current capacity of the Kota plant, which is 45 tons per annum, will be increased to 80 tons by March 1983.

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—"Heavy Water Production," New Delhi Home Service, BBC Summary of World Broadcasts, 2 July 1982; in Lexis-Nexis Academic Universe, 28 July 1982, <http://web.lexis-nexis.com>.

6 July 1982

Beginning October 1982, the Nuclear Fuel Complex (NFC) at Hyderabad will undergo an expansion program, which will increase its annual production of natural uranium from 100 to 200 tons.

—"Energy; Uranium," New Delhi Home Service, BBC Summary of World Broadcasts," 6 July 1982; in Lexis-Nexis Academic Universe, 14 July 1982, <http://web.lexis-nexis.com>.

15 July 1982

Prime Minister Indira Gandhi informs parliament the existing stock of nuclear fuel in the US-built Tarapur Nuclear Power Station (TAPS) will probably last until 1984. Furthermore, the enriched uranium sections of the Nuclear Fuel Complex (NFC) at Hyderabad will be closed down "in the event of non-receipt of further supplies." Gandhi assures parliament that her administration will keep Tarapur operational.

—"Shortage of Nuclear Fuel," New Delhi Home Service, BBC Summary of World Broadcasts, 15 July 1982; in Lexis-Nexis Academic Universe, 28 July 1982, <http://web.lexis-nexis.com>.

29 July 1982

The Reagan administration announces the United States and India have reached a compromise that will allow France to supply low-enriched uranium fuel to the American-built Tarapur nuclear power plant. The settlement will effectively waive a provision of the 1963 bilateral agreement between the United States and India which states that Tarapur nuclear power plant "shall be operated on no other special nuclear material than that made available by the United State commission and special nuclear material produced therefrom." According to the report, India agrees to place all the spent-fuel stored at Tarapur and the fuel provide by France under international safeguards. Also, India assures the United States that the fuel it supplied for the Tarapur facility will not be reprocessed without the consent of the United States. A US State Department official says, "the agreement provides that any special nuclear material produced at the Tarapur Atomic Power Station (TAPS) may only be reprocessed in India facilities upon a joint determination by the parties - both India and the United States - that the article of the (1963) agreement that include safeguards provisions maybe be effectively applied."

—"India Not Involved in Power Grouping, Says Indira Gandhi," Xinhua (Beijing), 30 July 1982; in Lexis-Nexis Academic Universe, 30 July 1982, <http://web.lexis-nexis.com>; Bernard Weintraub, "Reagan and Mrs. Gandhi Dispute on Nuclear Fuel for India," *New York Times*, 30 July 1982, p. 1; in Lexis-Nexis Academic Universe, 30 July 1982, <http://web.lexis-nexis.com>; "US to Okay French Fuel for Tarapur," *Nuclear Fuel*, 2 August 1982, p. 1.

8 August 1982

French Foreign Minister Claude Cheysson reports that France has been asked to supply nuclear fuel (low-grade uranium) for the Tarapur plant in India. According to Cheysson, France will not ask for "any special safeguards or joint determination for reprocessing spent fuel." However, it would require the "fissile materials from the reprocessing to be subject to control of the International Atomic Energy Association (IAEA)." Cheysson concludes that the United States would not be part of the agreement. Indian Prime Minister Indira Gandhi, when questioned whether India would reprocess the US-supplied spent fuel at Tarapur, said, "we will face" the issue when it comes

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—"French Foreign Minister Visits India," Xinhua (Beijing), 8 August 1982; in Lexis-Nexis Academic Universe, 8 August 1982, <http://web.lexis-nexis.com>; S.G. Roy, "The United States will not...", UPI, 8 August 1982; in Lexis-Nexis Academic Universe, 8 August 1982, <http://web.lexis-nexis.com>.

11 August 1982

Prime Minister India Gandhi tells parliament that India will reprocess the spent uranium from the Tarapur nuclear power plant, "despite objections from Washington." Gandhi remarks, "The American government has reservations about it, but that does not make a difference to us....India has made it clear that it reserves the right to reprocessing...and the work will be done as and when necessary." The prime minister adds that although the United States claims the right to prior consent to any reprocessing of spent fuel, such a stipulation was not written into the 1963 contract for the Tarapur plant. In a separate speech, India's Minister of State for Science and Technology C.P.N. Singh says that the Tarapur agreement has a specific clause that allows India to reprocess the plant's spent-fuel.

—S.G. Roy, "Gandhi: India will Reprocess Nuclear Fuel," UPI, 11 August 1982; in Lexis-Nexis Academic Universe, 11 August 1982, <http://web.lexis-nexis.com>; S.G. Roy, "India Vows to Reprocess Nuclear Waste," UPI, 12 August 1982; in Lexis-Nexis Academic Universe, 12 August 1982, <http://web.lexis-nexis.com>.

17 August 1982

Iran's speaker of the parliament, Akbar Hashemi Rafsanjani says that India will assist Iran in developing its nuclear energy program. He says, "What we need from India is cooperation. We do not want to depend on the Western powers and what we need we will get from India." An unidentified Indian industry ministry official confirms India intention to help Iran with its nuclear energy program. "India will consider favorably any specific request from Iran identifying the areas of cooperation needed for nuclear power generation," the official says.

—"An Iranian Leader...", UPI, 17 August 1982; in Lexis-Nexis Academic Universe, 17 August 1982, <http://web.lexis-nexis.com>.

30 August 1982

France suspends talks with India on the delivery of enriched uranium fuel for the Tarapur Atomic Power Station (TAPS) because of a disagreement over appropriate safeguards. Nuclear industry sources say that India has refused to submit to the International Atomic Energy Agency (IAEA) controls. The disagreement seems to revolve around the "perpetuity" and "pursuit" clause in the IAEA safeguards. "The 'perpetuity' clause calls for international supervision of the nuclear power plants, while the 'pursuit' clause provides for international supervision of the reprocessing of spent fuel." The Indian foreign ministry says France did not make acceptance of the above clauses a condition for the supply of nuclear fuel when India and the United States worked out an agreement on the issue. However, France maintains that Indian officials are well aware that both France and the United States adhere to IAEA regulations. An Indian foreign ministry official says, "It is for France now to make a political decision." Indian foreign secretary M.K. Rasgotra informs the US embassy in New Delhi that it was the responsibility of the United States to ensure that France would supply the nuclear fuel under the terms of the 1963 agreement. Rasgotra warns that if France persists in its demands for extra safeguards, India would abrogate the 1963 agreement and reprocess the spent-fuel and use the derived plutonium to run the Tarapur plant on mixed-oxide fuel. India's

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position is that since France is a surrogate supplier of nuclear fuel, it does not have any right to demand additional safeguards, not included in the original 1963 agreement.

—"France said Monday..." UPI, 30 August 1982; in Lexis-Nexis Academic Universe, 30 August 1982, <http://web.lexis-nexis.com>; S.G. Roy, "India Adamant over Nuclear Inspections," UPI, 31 August 1982; in Lexis-Nexis Academic Universe, 31 August 1982, <http://web.lexis-nexis.com>; William Claiborne, "Safeguards Issue Snags Tarapur Agreement; Indian Government Balks at Terms for Reprocessing Nuclear Fuel," *Washington Post*, 1 September 1983, p. A18; in Lexis-Nexis Academic Universe, 1 September 1982, <http://web.lexis-nexis.com>.

6 September 1982

India and France resume negotiations on the supply of nuclear fuel for the Tarapur Atomic Power Station (TAPS).

—"Foreign News Briefs," UPI, 6 September 1982; in Lexis-Nexis Academic Universe, 6 September 1982, <http://web.lexis-nexis.com>.

10 September 1982

French and Indian officials end three days of negotiations on the nuclear fuel supply issue without resolving their differences.

—K.K. Sharma, "Franco-Indian on N-Fuel End without Deal," *Financial Times* (London), 10 September 1982, p. 4; in Lexis-Nexis Academic Universe, 10 September 1982, <http://web.lexis-nexis.com>.

23 September 1982

During a press conference, Prime Minister Indira Gandhi confirms that the Soviet Union has offered to construct a 1,000MW nuclear power plant in India. Gandhi says New Delhi will "very carefully" examine the offer and leave "the technical details of the offer...to be worked out by experts later." An unidentified senior official from the Indian Atomic Energy Commission (AEC) says, "It is not a new offer. It was made when [Soviet President] Leonid Brezhnev came to New Delhi in December 1980." India did not accept the previous offer because it would have to alter its nuclear power development plans radically, says the official. India's nuclear power generation plans do not envisage building 1,000MW "super atomic power stations." Existing Indian power plants have a capacity below 500MW; and future plants will be designed to produce around 400MW.

—S.G. Roy, "India Cautious on Soviet Nuclear Offer," UPI, 23 September 1982; in Lexis-Nexis Academic Universe, 23 September 1982, <http://web.lexis-nexis.com>.

18 October 1982

A French Embassy official says France is prepared to rush a shipment of enriched uranium fuel for the US-built Tarapur nuclear power plant if its uranium stock "dropped below a level that would not sustain the plants operation." The official says, "If there is urgency, we could deliver the fuel and then again discuss the safeguards."

—"French Assure India of Nuclear Fuel Supply," *New York Times*, 19 October 1982, p. 5; in Lexis-Nexis Academic Universe, 23 September 1982, <http://web.lexis-nexis.com>.

27 November 1982

French Ambassador Andre Ross and India's Atomic Energy Commission (AEC) Chairman Homi N. Sethna sign an accord under which France will supply fuel the US-built Tarapur reactors. The Indo-French joint statement says,

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"Within the framework of the 1963 agreement for cooperation between India and the United States, France in lieu of the United States has agreed to supply enriched uranium for the Tarapur plant." The terms of the agreement call for India to purchase 20 tons of slightly enriched uranium (maximum amount under the 1963 agreement), at an annual price of \$6.3 million. Ross insists safeguards will be in place but did not elaborate.

—Richard S. Ehrlich, "France, India Reach Agreement on Uranium for US-built Plant," UPI, 27 November 1982; in Lexis-Nexis Academic Universe, 27 November 1982, <http://web.lexis-nexis.com>; William Claiborne, "India Greets Mitterrand After A-Pact Signed," *Washington Post*, 27 November 1982, p. A16; in Lexis-Nexis Academic Universe, 27 November 1982, <http://web.lexis-nexis.com>.

30 November 1982

The United States and India exchange diplomatic notes confirming the agreement signed between US President Ronald Reagan and Indian Prime Minister Indira Gandhi on 29 July 1982. By exchanging diplomatic notes, the United States waives its right to be the sole nuclear fuel supplier to the Tarapur nuclear power plant under article 2A of the 1963 US-India agreement. In return, India releases the United States from this obligation. France signed an agreement with India on 27 November 1982 to formally replace the United States as the single fuel supplier for the US-built Tarapur nuclear power plant until the end of the 1963 US-India agreement in 1993. US sources say three significant differences remain between the United States and India regarding the Tarapur nuclear power plant. The first difference is clarified by the exchanging of diplomatic notes. The sources say the new agreement implies that the Tarapur nuclear power plant will not operate on any other fuel, including mixed plutonium and uranium oxides. France will supply India with enriched uranium. Two other differences between the United States and India include: India's right to reprocess Tarapur's spent fuel, which the United States says it still has not conceded; and the United States contends that international safeguards still apply until the end of the original 30-year 1963 US-India agreement.

—Pearl Marshall, "US and India Take Last Formal Step Ending Fuel Supply Pact for Tarapur," *Nuclear Fuel*, 5 December 1982, p. 5.

20 December 1982

The *Washington Post*, citing US intelligence sources, alleges that Indian military leaders have prepared contingency plans to carry out a pre-emptive attack against Pakistan's nuclear facilities; the plans call for air strikes against Pakistan's New Labs (plutonium reprocessing plant) built next to the Pakistan Institute for Nuclear Science and Technology in Islamabad and the uranium enrichment plant being built in the village of Kahuta. The contingency plans were presented to Prime Minister Indira Gandhi as early as March 1982. Although Gandhi ruled out an attack at the time, she did not foreclose the option in the event Pakistan appears on the verge of acquiring a nuclear weapons capability. Apparently, the prime minister was concerned that an Indian attack might invite similar Pakistani retaliation against Indian nuclear facilities. India's Ambassador to the United States K.R. Narayanan dismisses the *Post* report as a "figment of imagination." Indira Gandhi's spokesperson H.Y. Prasad also denies the veracity of the *Post* story. Prasad says, "There is no substance in this at all. There is no proof..."

—Milton R. Benjamin, "India Said to Eye Raid on Pakistani A-Plants," *The Washington Post*, 20 December 1982, p. A1; in Lexis-Nexis Academic Universe, 20 December 1982, <http://web.lexis-nexis.com>.

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Late 1982

Prime Minister Indira Gandhi clears a top-secret project to prepare an aerial delivery platform for nuclear weapons. Subsequently, Chief Scientific Advisor to the Indian government, V.S. Arunachalam, tasks the Armaments Research and Development Establishment (ARDE), Pune, to prepare a container to hold an air-deliverable bomb. Arunachalam also requests Vice Chief of Air Staff Air Marshall Chandrakant Gole to earmark a Jaguar aircraft from an existing squadron and a pilot to the Aircraft Systems and Testing Establishment (ASTE) in Bangalore. The Indian Air Force (IAF) is not informed about the true purpose of the mission. Irrked by the conspiratorial nature of decisionmaking surrounding nuclear issues, the IAF later complains about the lack of institutional planning and the secrecy surrounding the project. [Note: Most analysts believe that India did not have a credible air-delivery platform until the mid-1990s. However, Dr. V.S. Arunachalam differs in his assessment and claims: "We had kept the platform ready and we would have delivered it even then. But it was kept a secret and we kept the misinformation going."]

—Raj Chengappa, "Arsenal For The Gods," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 284-285.

Late 1982

India and the Soviet Union arrive at an understanding on the nuclear submarine project during Soviet defense minister Dmitri Ustinov's visit to New Delhi. The Soviet Union allegedly agrees to secretly assist Indian scientists in the construction of a nuclear reactor for the submarine. However, the Soviet offer to dispatch technicians for this purpose to India is reportedly rejected by the Bhabha Atomic Research Center (BARC). Ustinov also offers to sell an older nuclear submarine to India. But Indian negotiators fear that the submarine will probably have to be decommissioned soon and leave India with the burden of disposing the radioactive reactor as well as saddle it with legal issues surrounding the spent nuclear fuel. In a counter offer, India proposes to lease a Soviet submarine instead. Ultimately, Indian and Soviet negotiators settle on a nuclear submarine lease price of approximately 3-4 billion rupees for a period of two to three years. As part of the deal, Indian naval crews will be trained in nuclear submarine operations at the headquarters of the Soviet Pacific fleet in Vladivostok.

—Raj Chengappa, "Arsenal For The Gods," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 288-289; Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), p. 650.

Late 1982

The Indian government forms a secret committee to oversee plans to build a nuclear submarine; the project is called Advanced Technology Vessel (ATV). Committee members include the Chairman of the Atomic Energy Commission (AEC), secretary of the Defense Research and Development Organization (DRDO), Chief of Naval Staff, cabinet secretary, defense secretary, finance secretary, and home secretary. To maintain secrecy, the committee is bound by the government's policy not to commit anything on paper. The ATV project is also kept out of parliament's purview by placing it under the DRDO, whose budget and accounting rules are secret.

—Bharat Karnad, "The Perils of Deterrence by Half Measures," *Nuclear Weapons & Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan India Limited, 2002), p. 649.

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Late 1982 or Early 1983

In a secret meeting, Prime Minister Indira Gandhi tentatively approves plans for additional nuclear tests. The meeting is attended by the Scientific Advisor V.S. Arunachalam, Bhabha Atomic Research Center (BARC) Director, Raja Ramanna, Principal Secretary to the Prime Minister, P.C. Alexander, Cabinet Secretary, Krishnaswamy Rao Sahib, and defense minister, Venkataraman. During the meeting, Arunachalam and Ramanna do not frame the tests as the beginning of a nuclear weaponization program; rather, they frame it as another experiment. The scientists also suggest that the risks of detection by US national technical means could be obviated by conducting the test at a test site other than Pokhran in the Rajasthan desert. However, the prime minister changes her mind and cancels the planned tests within a day of approving them. [Note: There is no documentary historical evidence to explain the reasons behind the change in the prime minister's decision to test. However, interviews with key Indian decisionmakers at the time suggest the prime minister retreated under the threat of negative economic repercussions of US and international sanctions.]

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 243.

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1981

January 1981

Dr. Raja Ramanna, who played a key role in India's May 1974 nuclear test, is appointed Director of the Bhabha Atomic Research Center (BARC) in addition to being the Secretary to the Department of Atomic Energy (DAE). Ramanna states that his key goals are to revive India's nuclear power program, complete the Dhruva or R-5 research reactor, and push for the completion of the Fast Breeder Test Reactor (FBTR) at Kalpakkam. In private, Ramanna also pushes for greater cooperation between BARC and the Defense Research and Development Organization in the design of a lighter, smaller, and more efficient nuclear explosive.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 228.

January 1981

Chief Scientific Advisor to the Indian government, Dr. Raja Ramanna, briefs Prime Minister Indira Gandhi on India's nuclear weapons program. Ramanna informs the prime minister that the nuclear weapons team at the Bhabha Atomic Research Center (BARC) has built a compact version of the device tested in 1974 and has also designed a more advanced boosted fission device. He then requests permission for field tests to validate the new designs and couches his case as a response to advances in Pakistan's nuclear weapons program. The prime minister responds cautiously and authorizes work on two new test shafts at India's nuclear test site in the Rajasthan desert.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 246-247.

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28 January 1981

Unit 1 of the Rajasthan Atomic Power Station (RAPS) resumes operations after a shut down in December 1980. A Department of Atomic Energy (DAE) spokesperson says an investigation into the incident at RAPS is under way. The Chairman of the Atomic Energy Commission (AEC) Homi Sethna says the incident demonstrated that the safety system was operational.

—"Indian Officials Remain Very Close-Mouthed about an Incident at RAPP-1," *Nucleonics Week*, 26 February 1980, p. 3.

February 1981

A spokesperson for India's Department of Atomic Energy (DAE) says that Indian and Soviet nuclear experts will meet in Mumbai in late February or early March 1981 to discuss the issues of radioactive waste disposal.

—"Soviet and Indian Nuclear Experts Will Meet in Bombay," *Nucleonics Week*, 5 February 1981, p. 9

February 1981

The Indian Army's 113 Engineer Regiment begins excavation work for the two new nuclear test sites in the Rajasthan desert.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 247.

February 1981

According to the Chairman of India's Atomic Energy Commission (AEC) Homi Sethna, two more uranium mines are expected to operate at Turamdih and Bhatin by 1985. Both mines will be located near India's only commercial mine and mill at Jaduguda, Bihar. Jaduguda currently processes 1,000 tons of ore per day and is expected to operate at this capacity for another 50 years. According to Sethna, the feasibility study for Bodel site in Madhya Pradesh is under way. Ninety tons of ore have been mined at Bodel to date.

—"India Plan to Have Two More Uranium Mines Operating by 1985," *Nuclear Fuel*, 16 February 1981, p. 4.

February 1981

Addressing Western reporters, director of the nuclear safety group at Bhabha Atomic Research Center (BARC) Vinay Meckoni says India will have to start reprocessing of Tarapur spent fuel either this year or in 1982 due to storage problems. However, he remarks that India will postpone reprocessing as long as possible, especially if the United States continues to supply enriched uranium to India. He says that any Tarapur plutonium recycled as mixed-oxide fuel will be placed under safeguards. BARC director Raja Ramanna promotes the mixed-oxide route as a way to self-reliance in nuclear fuel. However, Ramanna remarks that large-scale use of light water reactors (LWRs) using mixed-oxide fuel is not likely in India's case because it would be expensive to switch from Candu-type reactors to LWRs.

—"India's Sethna and Gonsalves Seek 'Polite' End to US Nuclear Pact," *Nuclear Fuel*, 13 April 1981, p. 9.

March 1981

A US government official says that the Reagan administration will abide by the Carter administration's pledge not to authorize the second shipment of enriched uranium to India until there is an actual need for fuel at the Tarapur

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Atomic Power Station (TAPS) and only after the Congress is consulted on the matter. The official remarks that "further fuel shipments cannot be made" since India refused to accept full-scope safeguards.

—"HGTR, Fusion Proponents Will Fight Reagan Cuts in Congress," *Nucleonics Week*, 19 March 1981, pp. 3-4.

March 1981

Indian Minister of State for Science and Technology C.P.N. Singh tells parliament the government is planning to begin construction of six more 235MW nuclear reactors during the Sixth Plan (1980-1985). Singh does not specify the proposed location or financing for these reactors. India currently has four commercial power reactors with a total generating capacity of 860MW, which makes up for about 2.5 percent of the country's total installed power capacity.

—"The Indian Government Proposes to Start Work on Six More Nuclear Units," *Nucleonics Week*, 26 March 1981, pp. 5-6.

March 1981

The British Broadcasting Corporation (BBC) reports that Indian scientists have discovered the 0.5 percent vanadium in the ocean sediments of the west coast. Vanadium is used in steel and non-ferrous alloys and has applications in India's nuclear and space projects.

—"Science and Technology: Geology," BBC Summary of World Broadcasts, 8 April 1981, in Lexis-Nexis Academic Universe, 8 April 1981, <http://web.lexis-nexis.com>.

21 March 1981

Unit 1 of the Rajasthan atomic power station (RAPS) is shut down because of a problem that "required urgent attention." However, the unit is expected to be back in operation within 10 days. Indian Minister of State for Science and Technology C.P.N. Singh admits in parliament that RAPS-1 suffered 19 outages in 1980; the problems were the consequence of equipment failure, grid problems, and human error. Singh also discloses that Unit 2 of RAPS is being test-run and is yet to begin full-scale commercial operations. The availability and capacity factors achieved for RAPS-1 during 1980 were 72.4 percent and 54.5 percent respectively. The corresponding figures for Unit 1 of the Tarapur station were 67.8 percent and 48.5 percent; and 78.4 percent and 48.4 percent for the second unit of the station.

—"Indian Officials Remain Very Close-Mouthed about an Incident at RAPS-1," *Nucleonics Week*, 26 February 1980, p. 3.

25 March 1981

Addressing parliament, India's Minister of State for Science and Technology C.P.N. Singh says that India will carry out a nuclear test "if it feels the need for such an experiment." He adds that the government plans to set up an atomic energy regulatory board to monitor the safety of India's nuclear installations. He says that currently the Nuclear Safety Review Committee monitors the safety of India's nuclear plants. The committee reports to the principal secretary of the Department of Atomic Energy (DAE). The Health Physics Division of the Bhabha Atomic Research Center (BARC) monitors "day-to-day radiological and industrial safety." According to Singh, "special committees of safety experts constituted by the department evaluate siting, design, commissioning and operation

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of facilities before they are authorized to go into operation."

—"India Will Proceed with a Peaceful Nuclear Explosion if Ever It Feels," *Nucleonics Week*, 2 April 1981, p. 7.

30 March 1981

India's Minister of State for Science and Technology C.P.N. Singh informs parliament that uranium occurrences have been discovered in Rajnadsaon district. He adds that "detailed geological investigations, including core drilling have begun at Bodel and Bhandaritola, where exploratory drilling indicated continuous mineralization over a strike length of 314 meters." The budget for India's Uranium Corporation for 1981-82 is estimated at over \$2 million.

—"Correction: India's Jaduguda Mine and Mill Produces," *Nucleonics Week*, 30 March 1981, pp. 12-13.

April 1981

The spokesperson of India's Ministry of External Affairs (MEA) J.N. Dixit says that India "holds exclusive title to the spent fuel produced at Tarapur. [Yet India is] still seeking joint determination [with the United States] because of its interest in maintaining good relations with [the latter]."

—"India's Sethna and Gonsalves Seek 'Polite' End to US Nuclear Pact," *Nuclear Fuel*, 13 April 1981, p. 9.

April 1981

In a United Services Institute (USI) symposium in New Delhi, the Indian Vice Chief of Naval Staff, Vice Admiral M.R. Schunker, citing the 1971 *USS Enterprise* episode, obliquely makes the case for an Indian nuclear force to deter potential superpower nuclear threats in the Indian Ocean region.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 359.

9 April 1981

In an address to parliament, Prime Minister Indira Gandhi says she suspects Pakistan is planning to develop nuclear device and underscores that India "will be forced to revise [its] nuclear program and will be compelled to develop [its] own nuclear weapons." She adds that her government will "respond in an appropriate way to any development."

—S.G. Roy, "India Hints at Nuclear Race with Pakistan," United Press International, 9 April 1981; in Lexis-Nexis Academic Universe, 9 April 1981, <http://web.lexis-nexis.com>; S.G. Roy "India Warns Pakistan against Making Nuclear Bomb," United Press International, 10 April 1981; in Lexis-Nexis Academic Universe, 10 April 1981, <http://web.lexis-nexis.com>.

14 April 1981

Indian foreign ministry spokesperson J.N. Dixit says that Indian officials (Atomic Energy Commission Chairman Homi Sethna and foreign secretary Eric Gonsalves), during their upcoming visit to Washington, DC, will bring up for discussion all the provisions of the 1963 Indo-US nuclear cooperation agreement to ascertain US intentions. Dixit states, "it has been repeatedly stated in parliament that the government of India would like the Indo-US nuclear cooperation under the 1963 agreement to continue. At the same time, the government cannot accept any extraneous conditions on the fulfillment of the obligations undertaken by the US under the Tarapur agreement."

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When questioned about the Indian Department of Atomic Energy's (DAE) assertion that India does not need permission from the United States to reprocess the Tarapur spent fuel, "because the fuel belongs to us," Dixit emphasizes that India "...holds exclusive title to the spent fuel produced at Tarapur." However, Dixit adds that India is seeking to reach a "joint determination" on the spent fuel with the United States because it values good relations with Washington. However, the "joint determination" is not necessary from a legal point of view.

—Pear Marshall, "India's Sethna and Gonsalves Seek 'Polite' End to US Nuclear Pact," *Nucleonics Week*, 13 April 1981, p. 9.

15 April 1981

In a written reply to Parliament, Prime Minister Indira Gandhi says that the Uranium Corporation is considering proposals to open three more uranium mines and two more mills in Bihar in addition to expanding the Jaduguda mine and mill. She says her government has already approved the Bhatin mining project at a cost of \$3 million. The project should be ready by the end of 1984-85. According to the Minister of State for Science and technology C.P.N. Singh, the Uranium Corporation has also prepared feasibility reports for opening mines at Turamdih and Narwapahar. Singh says the Uranium Corporation has submitted a feasibility report for recovering uranium from copper tailings at the Hindustan Copper Ltd.'s plants at Rakha and Mosabani, Bihar. According to Singh, India's reserves of U3O8 total 67,343 tons. Singh remarks that surveys in Madhya Pradesh discovered uranium occurrences with grades of 0.04 to 0.1 percent of U3O8. According to Singh, "detailed geological investigations, including drilling and/or underground development, have been taken up in promising areas to establish commercial viability." Singh adds that India also has 350,000 tons of thorium in terms of thorium oxide.

—"India's Parliament Told of Plans for Uranium Mine/Mill Expansion," *Nuclear Fuel*, 27 April 1981, p. 13.

15 April 1981

The secretary of India's Ministry of External Affairs Eric Gonsalves and the chairman of India's Atomic Energy Commission Homi Sethna meet with US Secretary of State Alexander Haig in Washington, DC to discuss the 30-year-old Indo-US Tarapur agreement.

—Washington News, United Press International, 14 April 1981; in Lexis-Nexis Academic Universe, 14 April 1981, <http://web.lexis-nexis.com>; "India's Sethna and Gonsalves Seek 'Polite' End to US Nuclear Pact," *Nuclear Fuel*, 13 April 1981, p. 9.

April 1981

Indian foreign secretary Eric Gonsalves privately assures US Assistant Secretary of State James Malone that India will not conduct a peaceful nuclear explosion (PNE) in the "current time frame." However, Gonsalves does not rule out nuclear tests in the long-term.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 229.

16 April 1981

India's Department of Atomic Energy (DAE) states in its annual report that it is conducting tests to recover plutonium from the spent fuel at the 100-ton Tarapur reprocessing plant. According to the report, Tarapur has successfully completed two test runs. The reprocessing will begin upon completion of the third trial now in

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progress. Each reprocessing campaign takes about two to four months. In a comment on the US delay in supplying fuel for the Tarapur station, the report complains about the fuel situation at Tarapur. It states, the fuel situation at Tarapur remains difficult and power levels have been reduced to conserve fuel. "An overdue consignment of 19.8 tons of uranium applied for in August 1979 and scheduled for delivery between February and September 1980 has not yet been received," says the report. "Another application for 19.8 tons was made in September 1980 for delivery between March and September 1981. The US has been informed by the government that continuing delays and uncertainties in supply of Tarapur fuel cannot be accepted. The government has also explained that it will not accept any conditions outside the framework of the existing cooperation agreement of 1963." The DAE report points out that in 1980 India successfully negotiated subsidiary safeguards arrangements for reprocessing spent fuel with the International Atomic Energy Agency (IAEA). Among other activities, the report states that structural designs and estimates for a second commercial reprocessing plant at Kalpakkam have been prepared. It further notes that 80 percent of construction work for the fast breeder test reactor (FBTR) at Kalpakkam has been completed. The reactor vessel has been fabricated, the electrical systems have been commissioned, and the air-conditioning and ventilation systems are almost ready. Two sodium pumps have been fabricated indigenously. The reactor research center is also working on the preliminary design for a 500MW sodium-cooled fast breeder reactor."

—"Indian Report Cites Progress In Reprocessing And Heavy Water Production," *Nucleonics Week*, 23 April 1981, p. 6.

22 April 1981

Addressing parliament, India's Minister of State for Science and Technology C.P.N. Singh says that India has the wherewithal to reprocess the Tarapur spent fuel.

—S.G. Roy, "India Ready to Reprocess Nuclear Fuel," United Press International, 22 April 1981; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

23 April 1981

The Reagan administration informs the Indian government that it has decided to end the 18-year-old Indo-US nuclear cooperation agreement on Tarapur. The decision is communicated through a "nonpaper" that was handed over to the Indian foreign secretary Eric Gonsalves and the Chairman of the Atomic Energy Commission (AEC) Homi Sethna during their 15 April visit to Washington, DC. However, a US State Department official denies that an official decision has been made.

—Don Oberdorfer, "US Is Ending 18-Year Nuclear Pact With India," *Washington Post*, 23 April 1981, p. A19; in Lexis-Nexis Academic Universe, 23 April 1981, <http://web.lexis-nexis.com>; Judith Miller, "India Says Atom Safeguards Will End If US Halts Fuel," *New York Times*, 24 April 1981, p. 3; in Lexis-Nexis Academic Universe, 24 April 1981, <http://web.lexis-nexis.com>.

24 April 1981

US intelligence reports indicate renewed activity at India's Pokhran nuclear test site in the Rajasthan desert.

—Judith Miller, "India Says Atom Safeguards Will End If US Halts Fuel," *New York Times*, 24 April 1981, p. 3; in Lexis-Nexis Academic Universe, 24 April 1981, <http://web.lexis-nexis.com>.

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27 April 1981

Indian experts testify before a parliamentary committee that Pakistan may test a nuclear device sometime between July and September of 1982. The experts suggest three possible nuclear test sites in Pakistan: the first in the Rann of Kutch bordering the Indian state of Gujarat; the second, in the Rajasthan desert bordering India; and the third in Balochistan bordering Iran.

—"Gandhi Warns South Asia Region 'Drifting toward War,'" United Press International, 28 April 1981; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

30 April 1981

India's foreign minister Narasimha Rao informs parliament that the United States has suggested that both countries terminate the 1963 agreement on supply of nuclear fuel for the Tarapur station. Rao admits that in light of the US suggestion, "...nothing can save this agreement."

—"New Delhi Aide Doubts Survival of Nuclear Agreement with US," *New York Times*, 30 April 1981; in Lexis-Nexis Academic Universe, 30 April 1981, <http://web.lexis-nexis.com>.

4 May 1981

India reportedly plans to commission six Narora-type 230MW pressurized heavy water reactors (PHWR) during its sixth plan period. The reactors are expected to cost 10 billion rupees. The longer-term, two decade plan includes an additional ten 230MW reactors, to be followed by 12 reactors of 500MW each. By the year 2000, India's Department of Atomic Energy (DAE) plans to generate 10,000MW using nuclear power.

—"Production and Transport: Nuclear Power Program," BBC Summary of World Broadcasts, 3 June 1981; in Lexis-Nexis Academic Universe, 3 June 1981, <http://web.lexis-nexis.com>.

5 May 1981

Allegations of Indian nuclear test preparations are indirectly confirmed by *Indian Express*.

—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), p. 228.

June 1981

The Indian Air Force (IAF) conducts a feasibility study on attacking and neutralizing Pakistan's uranium enrichment facility at Kahuta. Photographic evidence available to the IAF suggests that the Kahuta facility is guarded by French Crotale air-defense missiles and balloon barrages. The IAF concludes that it could probably destroy the Kahuta facility using its newly acquired Jaguar ground-attack aircraft; but that 50 percent of the aircraft would be lost to Pakistani defenses. Furthermore, an Indian attack could trigger an all-out war between India and Pakistan; or that Pakistan might retaliate by attacking India's nuclear facilities at the Bhabha Atomic Research Center (BARC) at Trombay. An Indian Atomic Energy Commission (AEC) official later discloses, "If we blew up Kahuta, uranium might be dispersed in Pakistan, but uranium is not nearly as toxic as plutonium, and our plants, which Pakistan would have counterattacked, have plutonium and are located closer to larger populations." Another senior Indian official explains India's hesitation in carrying out a pre-emptive attack on Kahuta saying, "We knew we would have to live with Pakistan's nuclear capability, and there was no way around it."

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—George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 240-241.

2 June 1981

Addressing a news conference, former Prime Minister Morarji Desai says the 1974 test was not a nuclear explosion but a powerful conventional one, "something like dynamite, but more powerful." Desai says that his assertion is not based not on the documents he saw when he was prime minister but "on the lack of fallout" after the explosion. A spokesperson of the Atomic Energy Commission (AEC) dismisses the argument as "the funniest thing heard so far."

—"Desai Says He Has Some Doubts about Indian Nuclear Tests in 1974," *New York Times*, 3 June 1981; in Lexis-Nexis Academic Universe, 3 June 1981, <http://web.lexis-nexis.com>.

6 June 1981

The Chairman of India's Atomic Energy Commission (AEC) Homi Sethna says India's nuclear program will "receive a big boost" after several fast breeder reactors (FBR) are commissioned by the end of the century. According to Sethna, the prototype 50MW fast breeder test reactor at Kalpakkam is "nearing completion."

—"Production and Transport: Nuclear Energy," BBC Summary of World Broadcasts, 17 June 1981; in Lexis-Nexis Academic Universe, 17 June 1981, <http://web.lexis-nexis.com>.

1 July 1981

A US embassy official in New Delhi says that US Assistant Secretary of State James Malone will confer with Indian officials on 14-15 July to discuss the supply of uranium fuel for the Tarapur nuclear power station.

—"US-India Talks Scheduled," *New York Times*, 1 July 1981, p. 9; in Lexis-Nexis Academic Universe, 1 July 1981, <http://web.lexis-nexis.com>.

2 July 1981

A US government source says that the Tarapur nuclear power station in a serious state of disrepair. India has sought \$2 million worth of spares and replacement parts (in-core detectors, control rod drive parts, shroud head bolts and a feed water sparger to replace a cracked unit) for the plant. The US vendor, General Electric, filed an export application for these parts with the US government in November 1981. However, the application is still under review. In view of the delay, India has begun looking elsewhere for the parts.

—"India's Tarapur Units Are In Serious Disrepair...," *Nucleonics Week*, 2 July 1981, p. 3.

10 July 1981

Prime Minister Indira Gandhi says she does not know "how it will help if [India] also [has] nuclear weapons." She remarks that India's nuclear program serves the purposes of power generation, agriculture, medicine, and "certain other such things."

—"Declaring that 'We Do not Believe in the Deterrent Theory,'" *Nucleonics Week*, 16 July 1981, p. 8.

11 July 1981

The Indian government plans to commence construction of two 235MW nuclear reactors at Kakrapar, Gujarat. Kakrapar will be India's fifth nuclear power station; it will eventually have four 235MW nuclear reactors.

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—"Industrial Production: Nuclear Energy," BBC Summary of World Broadcasts, 22 July 1981; in Lexis-Nexis Academic Universe, 22 July 1981, <http://web.lexis-nexis.com>.

20 July 1981

The Chairman of India's Atomic Energy Commission (AEC) Dr. Raja Ramanna signs a memorandum of understanding (MOU) on technical assistance for India's nuclear submarine project with the Soviet Union. Under the terms of the agreement, the Soviet Union reportedly agrees to help India build the submarine. In order to circumvent the issue of international safeguards on any reactors supplied by the Soviet Union, India's atomic energy establishment proposes to build the reactors in India using indigenous fuel supplies.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 251.

29 July 1981

An Indian government official says that the United States has proposed to continue to supply enriched uranium for the Tarapur plant, but after India meets three tough preconditions. First, that India will not explode a second nuclear device, even for peaceful purposes; second, India will not use more than 250 tons of spent fuel from previous US shipments to produce plutonium; and third, India will not seek enriched uranium from other countries.

—S.G. Roy, United Press International, 29 July 1981; in Lexis-Nexis Academic Universe, 29 July 1981, <http://web.lexis-nexis.com>.

30 July 1981

US Assistant Secretary of State James Malone denies that the United States has set preconditions for the supply of additional uranium to India. Malone says, "we've made no suggestions through diplomatic channels of that nature...everything [is] on the public record." An unidentified Indian official says that India would like the United States to fulfill its obligations under the 1963 agreement. On the issue of the reported US preconditions, the official says that India would need more time to study US demands, and that further negotiations would be needed.

—United Press International, 30 July 1981; in Lexis-Nexis Academic Universe, 30 July 1981, <http://web.lexis-nexis.com>.

30 July 1981

US Assistant Secretary of State James Malone meets the Chairman of India's Atomic Energy Commission (AEC) Homi Sethna and other Indian officials in New Delhi. According to the spokesperson of India's Ministry of External Affairs (MEA) J.N. Dixit, the two sides discussed the US position that India should not explode any more nuclear devices and should not reprocess the 250 tons of US-supplied spent fuel into weapons-grade plutonium.

—"US and India Hold Talks on Uranium Shipments," United Press International, 30 July 1981; in Lexis-Nexis Academic Universe, 30 July 1981, <http://web.lexis-nexis.com>.

31 July 1981

Indian and US officials agree to hold one more round of talks on the Indo-US nuclear cooperation agreement in

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Washington, DC. The spokesperson for India's foreign ministry hints that both countries are discussing ways to amicably dissolve the 18-year old nuclear cooperation agreement.

—"US and India Plan More Atom Talks," *New York Times*, 1 August 1981, p. 2; in Lexis-Nexis Academic Universe, 1 August 1981, <http://web.lexis-nexis.com>.

20 August 1981

Minister of State for Science and Technology C.P.N. Singh says that orders for the purchase of materials and equipment for the Kakrapar Atomic Power Station (KAPS), Gujarat, have been placed. According to Singh, construction of the main plant building will begin in 1982 and units one and two should be completed by 1990 and 1991 respectively. The Kakrapar station will use indigenous uranium as fuel.

—"Industrial Production: Nuclear Energy," BBC Summary of World Broadcasts, 2 September 1981; in Lexis-Nexis Academic Universe, 20 August 1981, <http://web.lexis-nexis.com>.

20 August 1981

In an address to parliament, Prime Minister Indira Gandhi says that "development work on indigenous mixed oxide fuel for the Tarapur plant has been carried out and found feasible."

—S.G. Roy, United Press International, 20 August 1981; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

26 August 1981

New Delhi home service reports that two units at the Tarapur atomic power station and two 220MW units at the Rajasthan atomic power station are currently in commercial operation. According to the report, India's current power generation from nuclear power stations constitutes 3,000 million kWh.

—"Industrial Production: Nuclear Energy," BBC Summary of World Broadcasts, 9 September 1981; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

28 August 1981

Minister of External Affairs Narasimha Rao submits a report to parliament stating the Indian government has taken steps to ensure continued operation of the Tarapur nuclear power plant. The report also states that "it has been made clear to the United States that all obligations flowing from the 1963 agreement would cease to be binding on either side if the contractual supply relationship is terminated." Rao adds that during the last round of talks in July, the United States "once again indicated...that they are not in a position to continue the nuclear supply relationship."

—United Press International, 28 August 1981; in Lexis-Nexis Academic Universe, 28 August 1991, <http://web.lexis-nexis.com>.

31 August 1981

Indian journalist Yogi Aggarwal reports in *Sunday Observer* that "from the 1980 onwards, work on the development of components needed for another nuclear device was once again stepped up at the Bhabha Atomic Research Center (BARC). In March and April 1981, a team of nuclear scientists at BARC prepared 12kg of plutonium to be machined into an explosive core. Furthermore, spent fuel from the CIRUS research reactor has been

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reprocessed at the unsafeguarded Tarapur nuclear reprocessing facility. Aggarwal states that although the recovered plutonium would likely be used in fuel for the Fast Breeder Test Reactor (FBTR), it could just as easily be diverted for weapons purposes.

—Cited in, George Perkovich, "More Robust Nuclear Policy Is Considered," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Los Angeles, and London: University of California Press, 1999), pp. 228-229.

September 1981

In an address to parliament, Prime Minister Indira Gandhi says that the sixth plan (1980-1985) budget outlay for nuclear power generation and isotope production is \$1.2 billion. She says the government plans to add 690MW of installed nuclear capacity during this period. The government is also planning to begin construction of six 235MW nuclear reactors. Prime Minister Gandhi notes that the work on two reactors at Kakrapar has already begun; two Kakrapar units are expected to be completed by 1990-91. According to Gandhi, the government has set up a site selection committee to recommend the locations for four other reactors. Gandhi adds that the Safety Review Committee was reconstituted and "given the task of carrying out the regulatory and safety functions envisaged under Atomic Energy Act of 1962." Addressing the issue of heavy water leakage in unit one of the Rajasthan atomic power station (RAPS-1), the Minister of State for Science and Technology C.P.N. Singh says that eight tons out of an inventory of 210 tons "escaped from the reactor system in early August into a shielded vault in the reactor building." He remarks that most of the heavy water has been recovered, purified, and placed back into the system. According to Singh, RAPS-1 had nine outages in 1978, 14 in 1979, and 19 in 1980 "due to equipment malfunction, grid problems, and human error. However, a continuous and ongoing review of the operational problems is under way and appropriate measures are being carried out to improve performance." Singh remarks that RAPS-2, commissioned in early 1981, had 11 outages to date and is operating at 36.64 percent capacity.

—"India's Sixth Plan (1980-1985) Outlay for Nuclear Power Generation," *Nucleonics Week*, 10 September 1981, p. 6.

September 1981

India files another export application in the United States through its agent Edlow International for the sale of 19,858kg of enriched uranium. India's position is that it is entitled to purchase nuclear fuel for the Tarapur plant under the provisions of the 1963 agreement with the United States, until that agreement is terminated.

—"The Indians are Back with Another Application," *Nuclear Fuel*, 28 September 1981, p. 8.

3 September 1981

Addressing the Parliament, Prime Minister Indira Gandhi says that "if the United States stops the supply of enriched uranium, India's nuclear fuel complex will shut down, but the closure will not affect operation of the Tarapur plant... The Tarapur plant will be kept working with alternative means." An Indian nuclear scientist remarks that the prime minister's statement indicates that India is "confident" to operate Tarapur using mixed oxide fuel.

—S.G. Roy, United Press International, 3 September 1981; in Lexis-Nexis Academic Universe, 3 September 1981, <http://web.lexis-nexis.com>.

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9 September 1981

Addressing Lok Sabha, the Minister of State for Science and Technology C.P.N. Singh says that India will become self-sufficient in heavy water production for nuclear power plants after the Kota and Talcher plants become operational in March 1982. He adds that more heavy water plants will be constructed in the future to meet the growing demand.

—"Industrial Production, Nuclear Energy," New Delhi Home Service, BBC Summary of World Broadcasts, 9 September 1981; in Lexis-Nexis Academic Universe, 23 September 1981, <http://web.lexis-nexis.com>.

Late September 1981

In an interview to *Age* magazine (Australia), Prime Minister Indira Gandhi says that India will carry out nuclear tests if necessary "for science or development," but it will not produce a nuclear bomb. Gandhi says that India's transition from peaceful to military uses of nuclear energy will depend on "the real danger" to India's national security interests. She downplays suggestions that India's nuclear policy is related to Pakistan's nuclear developments.

—"Indira Gandhi on Indian Nuclear Tests," Xinhua General Overseas News Service, 21 September 1981; in Lexis-Nexis Academic Universe, 21 September 1981, <http://web.lexis-nexis.com>.

October 1981

The scientists of the Atomic Minerals Division (AMD) of India's Atomic Energy Commission (AEC) discover "significant" uranium reserves in the Darba area of the Bastar district of Madhya Pradesh. They also establish uranium source in the Bondal area of Rajnandagon district of Madhya Pradesh. The *Mining Journal* reports that "the reserve which spreads over about 1,250m of strike and persists to a vertical depth of 250m" is estimated at 1,956 tons of uranium at 0.067 percent grade. Indian scientists have also discovered uranium mineralization in three zones near Brijranigad and Sileth in the Tehri district of Uttar Pradesh.

—"Indian Zn and U Fund," *Mining Journal*, October 1981, p. 261; in Lexis-Nexis Academic Universe, October 1981, <http://web.lexis-nexis.com>.

15 October 1981

The state-owned Electronics Corporation of India Limited (ECIL) develops a sophisticated computer system indigenously. The highly sophisticated computer, ECIL-332, will help monitoring and controlling nuclear plant operations." The Department of Atomic Energy (DAE) has already received the first ECIL-332 and will use it as a "nuclear power plant simulator for training plant operators. The computer will also monitor and control fast breeder test reactor at Kalpakkam."

—"Science and Technology, Computer Development," BBC Summary of World Broadcasts, 28 October 1981; in Lexis-Nexis Academic Universe, 28 October 1981, <http://web.lexis-nexis.com>.

22 October 1981

The US Senate rules that the United States will stop providing aid to Pakistan or India if either country detonates a nuclear device.

—"US Threat on A-Bomb Derided in India," *New York Times*, 23 October 1981, p. 5; in Lexis-Nexis Academic Universe, 23 October 1981, <http://web.lexis-nexis.com>.

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November 1981

Unit 1 of the Rajasthan atomic power station is shut down again due to a light water leakage in one of the end shields of the reactor. According to the chairman of India's Atomic Energy Commission (AEC) Homi Sethna, there is no "grave danger" or "radiation hazard." Sethna says that Unit 1 was taken out of service on 20 September for a week's maintenance service; during the maintenance process, "it was observed that there was a leak of light water from one of the end shields. Since the leak was suspected in an area of the end shield that is normally not accessible, various specialized detection methods have to be used to pinpoint the exact position. Although the size of the leak is small, it is proposed to close this leak prior to restarting the unit. The necessary laboratory and development activities to close the leak in situ have been worked out." The discovery of the leak has led the maintenance schedule of RAPP-1, which was earlier scheduled for December, to be brought forward; the reactor is now expected to resume operations in December. Sethna also clarifies that contrary to press reports that RAPP-2 was not operating, the reactor is indeed operating at 120MW instead of its rated power level of 200MW because two heat exchangers need replacement. He underscores that Unit 2 will not be shut down until Unit 1 resumes operation.

—Pearl Marshall, "India's RAPP-1 220MW CANDU-type Reactor is Out Again This Month," *Nucleonics Week*, 5 November 1981, p. 8.

November 1981

Nucleonics Week reports that unit-1 of the Madras atomic power station (MAPS) is undergoing light-water commissioning and will be ready to receive heavy water by 1982; Unit 2 is expected to be commissioned in 1984. However, the Narora reactors, with their doubled capacity steam generators will not be ready for commissioning until 1986-87. The Narora Atomic Power Station (NAPS) is several years behind the schedule, because of the Department of Atomic Energy's (DAE) decision in 1977-78 to add cooling towers and the more recent emphasis on safety. Furthermore, the project has suffered from other delays related to equipment production and shortage of building materials such as cement and steel. However, the DAE proposes to use the Narora units as the standard design for at least ten more nuclear reactors, six of which are slated for construction during the sixth plan period.

—Pearl Marshall, "India's RAPP-1 220MW CANDU-type Reactor is Out Again This Month," *Nucleonics Week*, 5 November 1981, p. 9.

December 1981

Chief of Naval Staff Admiral Pereira writes to Prime Minister Indira Gandhi objecting to the nuclear submarine deal. Pereira argues that the Soviet offer will make India dependent on the Soviet Union and prevent the Indian Navy from consummating the deal to purchase HDW diesel-electric boats from West Germany. However, the prime minister rebuts the naval chief's case arguing that monies for the HDW contract have already been sanctioned and would not be affected by the nuclear submarine deal.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 253.

2 December 1981

Addressing Lok Sabha (lower house of parliament), India's Minister of State for Science and Technology C.P.N. Singh says that the Tarapur atomic power station will not be shut down if the United States stops providing

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enriched uranium. He says alternative fuel has been developed to keep the plant in operation. Singh adds that India cannot receive enriched uranium from any other source until the [1963 nuclear cooperation] treaty with the United States is terminated.

—"Industrial Production: Alternative Fuel for Tarapur Developed," New Delhi Home Service, BBC Summary of World Broadcasts, 2 December 1981; in Lexis-Nexis Academic Universe, 9 December 1981, <http://web.lexis-nexis.com>.

9 December 1981

Speaking at Indo-French technology symposium in New Delhi, French Minister for Research and Technology Jean-Pierre Chevenement says that Indo-French cooperation in the nuclear field has slowed down recently. He adds that France is "ready to help India in any area of nuclear energy research and development." He remarks that India has made substantial progress in the field.

—"India, France to Strengthen Cooperation in Scientific Research," Xinhua General Overseas News Service, 9 December 1981; in Lexis-Nexis Academic Universe, 9 December 1981, <http://web.lexis-nexis.com>.

10 December 1981

Addressing Rajya Sabha (upper house of parliament), Prime Minister Indira Gandhi announces a "three-point program to increase the availability of uranium through intensified exploration and strengthening analytical facilities." India also plans to build a spent-fuel reprocessing plant at Kalpakkam; one plant has already been built at Tarapur.

—"Production and Transport: Nuclear Fuel," New Delhi Home Service, BBC Summary of World Broadcasts, 10 December 1981; in Lexis-Nexis Academic Universe, 23 December 1981, <http://web.lexis-nexis.com>.

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1980

8 January 1980

US State Department spokesperson Hodding Carter says the United States plans to negotiate the issue of nuclear fuel supplies with India and the issue would be decided on "larger grounds" than the return of the Congress party led by Indira Gandhi to power.

—"US-India Discussions Planned on Nuclear Fuel," Associated Press, 8 January 1980; in Lexis-Nexis Academic Universe, 8 January 1980, <http://web.lexis-nexis.com>.

27 January 1980

Unit 1 of the Rajasthan Atomic Power Station (RAPS) stops producing power. Joint Secretary of India's Ministry of Energy B. Sinha says the government expects some information on the power outage by 1 February.

—"An Unexpected Outage of India's RAPP-1 Nuclear Unit," *Nucleonics Week*, 31 January 1980, p. 4.

February 1980

A report by an Indian government sponsored "official working group on energy policy" concludes that India's

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current uranium resources are sufficient to support the first stage of the country's nuclear power program of about 8,000MW. Of the current estimates of 34,000 tons of uranium ore, 15,000-tons are considered economically exploitable. An additional 27,000 of uranium ore may also be available. The report suggests that new "target areas" for uranium resources have been identified in the "crystal lines" of Madhya Pradesh; uraniferous zones have also been discovered in the "pre-Cambrian conglomerates" in Rajasthan and other parts of central India. However, the report is optimistic that India's thorium deposits are expected to yield approximately 363,000-tons of thorium oxide, a quantity sufficient to support a "very large capacity" of thorium-fueled reactors in the later stages of the nuclear power program.

—"India Says It Has 61,000 Tonnes of U3O8," *Nuclear Fuel*, 18 February 1980, p. 5.

12 February 1980

Financial Express (Mumbai) reports that heavy water leakage caused a power outage at the Unit 1 of the Rajasthan Atomic Power Station (RAPS) on January 27. The unit will not resume operations before February 15.

—"The Outage of India's RAPP-1 Nuclear Unit Last Month Was Caused," *Nucleonics Week*, 14 February 1980, p. 4.

15 February 1980

Finland signs a memorandum of understanding with India to provide technical assistance in the construction of nuclear power stations.

—"Finland Cooperation," BBC Summary of World Broadcasts, 27 February 1980; in Lexis-Nexis Academic Universe, 27 February 1980, <http://web.lexis-nexis.com>.

Late February 1980

A Press Trust of India report quotes an informed source as saying that leaks in coolant pipes at the Tarapur facility could have caused a major nuclear accident had the plant not already been shut down for a test. The source claims that there was the possibility of the nuclear core melting and radioactive water flooding the plant. India's Department of Atomic Energy (DAE) confirms the leaks in the coolant pipes, but describes them as "insignificant." DAE officials say that repairs of the "pinhole leaks" discovered during the test are underway.

—International News, Associated Press, 2 March 1980, in Lexis-Nexis Academic Universe, 2 March 1980, <http://web.lexis-nexis.com>.

March 1980

Atomic Energy Commission (AEC) Chairman Homi Sethna says that even if the United States fails to honor its commitment to supply enriched uranium fuel for the Tarapur Atomic Power Station (TAPS), the station will not shut down. India is considering the possibility of using mixed oxide fuel as an alternative to the US-supplied enriched uranium fuel. Sethna says that India is also negotiating with France for the supply of enriched uranium fuel for the Kalpakkam fast breeder test reactor (FBTR); the reactor is slated for commissioning in mid-1981.

—"India's 400MW Tarapur Nuclear Station Will not Shut Down," *Nucleonics Week*, 20 March 1980, p. 9.

10 March 1980

The "grace period" under the 1978 US Nuclear Nonproliferation Act, during which all recipients of US nuclear technology were required to submit to full-scope international safeguards, ends. India declines to accept full-scope

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safeguards on its nuclear facilities, insisting that the United States is obliged to supply enriched uranium fuel for the Tarapur nuclear facility under a long-term agreement signed before Congress passed the new law. US State Department spokesperson Hodding Carter says that the United States could nevertheless approve two major shipments of nuclear fuel for India's Tarapur Atomic Power Station (TAPS) since the requests were submitted before September 1979, the preliminary deadline under the new law. Sources suggest the United States is seeking Indian assurances that it will refrain from reprocessing spent nuclear fuel from Tarapur into weapons-grade plutonium and will abstain from manufacturing nuclear weapons.

—Robert B. Cullen "US May Still Ship Nuclear Fuel to India," Associated Press, 10 March 1980; in Lexis-Nexis Academic Universe, 10 March 1980, <http://web.lexis-nexis.com>.

13 March 1980

In an address to parliament, Prime Minister Indira Gandhi says her government "remains committed to the use of atomic energy for peaceful purposes [but it] would not hesitate from carrying out nuclear explosions...or whatever is necessary in the national interests." She remarks, "we must have our eyes and ears open...and be in touch with the latest technology."

—"Mrs. Gandhi Leaves Open Her Nuclear Options," Associated Press, 13 March 1980, in Lexis-Nexis Academic Universe, 13 March 1980, <http://web.lexis-nexis.com>.

20 March 1980

Responding to some parliamentarians demand that India renounce the Indo-US nuclear fuel supply contract for the Tarapur plant, external affairs minister P.V. Narasimha Rao tells Lok Sabha (India's lower house of parliament) that "the time has not come to abrogate" the agreement. Rao adds that the government is "prepared to meet any contingency arising from non-supply of fuel."

—"Not Ready to Cancel a US Nuclear Fuel Supply Contract," Associated Press, 20 March 1980, in Lexis-Nexis Academic Universe, 20 March 1980, <http://web.lexis-nexis.com>.

14 March 1980

The chairman of India's Atomic Energy Commission (AEC), Dr. H.N. Sethna, says the AEC is planning to build three more heavy water plants in India; these plants will likely be based on the hydrogen-sulphide water-exchange process and need not be coupled with fertilizer plants.

—"Nuclear Energy," BBC Summary of World Broadcasts, 26 March 1980; in Lexis-Nexis Academic Universe, 14 March 1980, <http://web.lexis-nexis.com>.

27 March 1980

Prime Minister Indira Gandhi notifies Rajya Sabha (India's upper house of parliament) that India needs to set up more heavy water plants to achieve self-sufficiency in heavy water. Gandhi says the plants in Nangal, Baroda, and Tuticorin have begun heavy water production; the plant in Talcher is in the process of completion; and the Kota plant should be ready by November 1980.

—"Nuclear Energy," BBC Summary of World Broadcasts, 9 April 1980; in Lexis-Nexis Academic Universe, 9 April 1980, <http://web.lexis-nexis.com>.

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April 1980

The Bhabha Atomic Research Center (BARC) submits a proposal to Prime Minister Indira Gandhi to build a nuclear reactor for a nuclear submarine at a cost of approximately 1.5 billion rupees. The BARC proposal is reviewed by a naval team led by Captain Bharat Bhushan and his deputy Subbarao. The Indian Navy identifies 14 design flaws in the proposed reactor design, and points to violations of some basic safety requirements observed in nuclear submarines. The Navy's assessment is reviewed by the prime minister who declines BARC's request. Subsequent to the rejection, BARC begins working on its fourth reactor design.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 248-249.

April 1980

Prime Minister Indira Gandhi hints that India is developing uranium enrichment technology. In a statement before parliament, Gandhi says, "...so far as enrichment [uranium] is concerned... we want to be ready...I do not think it would be proper to mention the details [of the program] publicly."

—"Indian Enrichment Experiments Ostensibly for Weapons Purposes Continue," *Nucleonics Week*, 10 April 1980, p. 12.

April 1980

Nucleonics Week reviews operations of India's heavy water plants and reports the Tuticorin plant has been working "fairly well" since the beginning of 1980. The Tuticorin plant was commissioned in mid-1978 but initial operations were not smooth due to "wide fluctuations in voltage and because its feed material was cut off by the temporary shutdown of the ammonia plant of the Southern Petrochemical Industries Corp. fertilizer complex." The Baroda heavy water plant was initially scheduled for commissioning in late 1975. However, it was shut down in 1977, merely seven months after heavy water production began, "due to an explosion caused by the mechanical failure of an ammonia quench pipe." The Chairman of the Atomic Energy Commission (AEC) Homi Sethna attributes this accident to "poor design standards and the quality of the metal used." Sethna remarks that "the entire high-pressure portion of the plant was damaged by the fire..., the terminal insulation and electric wiring were burned out and the instrumentation was affected." The Baroda plant is expected to resume operations in late April 1980. Baroda will supply heavy water to Madras Atomic Power Station (MAPS) at Kalpakkam and later to Narora Atomic Power Station (NAPS) in Uttar Pradesh. According to the Department of Atomic Energy (DAE), the Talcher heavy water plant was "mechanically ready" since December 1979 but commissioning was delayed due to severe power shortages in Orissa. A heavy water plant at Kota is expected to be commissioned by mid-1981. The Kota plant uses the hydrogen sulfide water exchange process, developed indigenously. *Nucleonics Week* claims the Nangal plant in Punjab is the only heavy water plant that has been operating consistently since its commissioning in 1962. The Nangal plant supplies heavy water to the CIRUS research reactor.

—"India's Four Large Heavy Water Plants are Beginning to Come into Service," *Nucleonics Week*, 17 April 1980, p. 9.

8 May 1980

US President Jimmy Carter issues an executive order authorizing the export of enriched uranium for the Tarapur nuclear facility for a period of two years. A spokesperson for the Indian Ministry of External Affairs (MEA) says

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Carter's "decision is only an interim step, but it is a positive one... India is awaiting further developments and arrival of the fuel."

—"India Welcomes Carter's Decision to Resume Supply of Enriched Uranium," Xinhua General Overseas News Service, 9 May 1980; in Lexis-Nexis Academic Universe, 9 May 1980, <http://web.lexis-nexis.com>.

16 May 1980

The US Nuclear Regulatory Commission (NRC) denies an export license for two shipments of 46,689-pounds of low-enriched uranium fuel and replacement parts to India's Tarapur reactor and forwards its ruling to President Carter for final decision. The commission is required by the US Atomic Energy Act to ensure that exports will not be diverted toward the production of nuclear weapons or be transferred to a third country without US permission. Commissioners Victor Gilinsky and Peter Bradford hold that a favorable presidential decision to export the fuel will "gravely" impair the Nuclear Nonproliferation Act of 1978. Commissioner Kennedy, although absent for the vote, says that he is in favor of a presidential decision to approve the exports. The remaining two commissioners concur in denying the export application. The NRC's denial of the export application is based on Prime Minister Indira Gandhi's refusal to rule out any further tests of nuclear devices. The NRC chairman John Ahearne notes he voted in favor of exports for the Tarapur station in March 1979 because the earlier Morarji Desai government had "acted responsibly and courageously" on nonproliferation safeguards. However, the successor Indira Gandhi government has made "no progress" in achieving full-scope safeguards and according to a State Department memorandum, Gandhi's government has not ruled "out the option of so-called peaceful nuclear experiments, should this be considered in India's interest."

—Stan Benjamin "NRC Refuses to Approve Nuclear Shipments; Issue Goes to Carter," Associated Press, 16 May 1980, in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>; "NRC Refuses to Approve Nuclear Shipments," Associated Press, 17 May 1980; in Lexis-Nexis Academic Universe, 17 May 1980, <http://web.lexis-nexis.com>; "Congressional Fight Seen If Carter Approves India Fuel Exports," *Nucleonics Week*, Vol. 21 No. 21, 22 May 1980, pp. 1-2.

22 May 1980

Congressmen Ed Markey, Thomas Downey, John Buchanan, and Mickey Edwards appeal to President Carter to ban further shipments of enriched uranium to fuel India's Tarapur Atomic Power Station (TAPS) on grounds that "...India has exploded a nuclear device using nuclear materials from a civilian program, and since India steadfastly asserts its right to future atomic tests..."

—"Carter Urged to Halt Nuclear Shipments to India," Associated Press, 22 May 1980, in Lexis-Nexis Academic Universe, 22 May 1980, <http://web.lexis-nexis.com>.

28 May 1980

India receives the first installment of heavy water from the Soviet Union. Under an agreement signed by the two countries in February 1979, the Soviet Union agreed to supply India with a total of 250 tons of heavy water. In April 1980, India was also finally able to use 200 tons of heavy water purchased from the Soviet Union delivered under a contract in 1976, after the latter agreed to waive the full inspection condition.

—"India Receives 30 Tons of Heavy Water from Soviet Union," Xinhua General Overseas News Service, 29 May 1980, in Lexis-Nexis Academic Universe, 29 May 1980, <http://web.lexis-nexis.com>; "India Receives First Shipment

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of Heavy Water," Associated Press, 29 May 1980; in Lexis-Nexis Academic Universe, 29 May 1980, <http://web.lexis-nexis.com>.

1 June 1980

Prime Minister Indira Gandhi tells a US congressional delegation that while India opposes the development of nuclear weapons, it could not rule out nuclear explosions for peaceful purposes. Explaining the reasons behind India's refusal to sign the nuclear nonproliferation treaty Gandhi says, "it was impractical...[and] had no consequence."

—"India Might Conduct Nuclear Explosion for 'Peaceful Purposes'," Xinhua General Overseas News Service, 1 June 1980, in Lexis-Nexis Academic Universe, 1 June 1980 <http://web.lexis-nexis.com>.

5 June 1980

Commenting on the controversy in the United States regarding the supply of low-enriched uranium fuel and spare parts for the Tarapur Atomic Power Station (TAPS) to India, a spokesperson for India's Ministry of External Affairs (MEA) says, "we will not take a position in this matter...it's none of our business how the US government conducts its internal affairs. We have a contract and either the US government delivers or it doesn't." The spokesperson adds, "We have been very patient. One shipment is more than 18 months overdue and in any normal business transaction you [the United States] would have been sued for breach of contract. But we are prepared to understand that you [the United States] have your difficulties." An Indian Department of Atomic Energy (DAE) discloses that because of the delay in the US shipment, work had virtually stopped at the Hyderabad-based nuclear fuel fabrication facility. The facility had run out of fresh fuel and was operating at one-fifth of its capacity.

—"The Indian Foreign Ministry Gave a Noncommittal Response," *Nucleonics Week*, 5 June 1980, pp. 4-5.

11 June 1980

Prime Minister Indira Gandhi concedes in parliament that "uncertainties and delays" over a nuclear fuel shipment from the United States had forced India to reduce the output of the Tarapur Atomic Power Station (TAPS). Gandhi also confirms that India's atomic power station in Rajasthan is suffering operational problems due to pipe leakages.

—"Delayed US Fuel Shipment Curbed Indian A-Plant," *New York Times*, 11 June 1980, in Lexis-Nexis Academic Universe, 12 June 1980, <http://web.lexis-nexis.com>.

19 June 1980

US President Carter overrules the decision of Nuclear Regulatory Commission (NRC) to deny export licenses for the supply of enriched uranium to India's Tarapur Atomic Power Station (TAPS). US Secretary of State Warren Christopher says that there is a danger that the Soviet Union will "supplant the United States" should the latter refuse to supply enriched uranium to India. He adds that "a positive decision on Tarapur will encourage India in the long term to act in ways consistent with US interests."

—Gene Kramer "India Says US Nuclear Fuel is for Peace," Associated Press, 20 June 1980, in Lexis-Nexis Academic Universe, 20 June 1980, <http://web.lexis-nexis.com>; "US to Export Nuclear Fuel to India," Xinhua General Overseas News Service, 20 June 1980, in Lexis-Nexis Academic Universe, 20 June 1980, <http://web.lexis-nexis.com>.

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20 June 1980

Responding to US President Carter's decision to export nuclear fuel to India, a spokesperson for India's Ministry of External Affairs (MEA) J.N. Dixit says that the Indian government is "still awaiting further developments." He remarks that the government is aware of a 60-day lag before the actual delivery of the fuel. During this time, the US Congress can overrule the president's decision by a two-thirds majority. Further, Dixit assures that India's nuclear program exists entirely for peaceful purposes. However, he notes that the government does not rule out the possibility of carrying out a nuclear test if it is necessary for peaceful nuclear energy projects. Dixit also categorically states the Indian government reserves the right to reconsider any policy for national security purposes.

—Gene Kramer "India Says US Nuclear Fuel is for Peace," Associated Press, 20 June 1980, in Lexis-Nexis Academic Universe, 20 June 1980, <http://web.lexis-nexis.com>.

9 July 1980

Prime Minister Indira Gandhi informs parliament that the fuel for Rajasthan and Madras atomic power stations has been developed indigenously. She says that uranium ore was recently discovered in the Saharanpur district of Uttar Pradesh; the grade of the ore will become known after more research.

—"Nuclear Energy," BBC Summary of World Broadcasts, 23 July 1980, in Lexis-Nexis Academic Universe, 23 July 1980, <http://web.lexis-nexis.com>.

13 July 1980

The 235MW turbo-generator for the Narora Atomic Power Station (NAPS) is successfully tested at the Ranipur Heavy Electricals plant in Uttar Pradesh state. The nuclear turbine for the generating unit will be built at the Bhopal unit of Bharat Heavy Electricals.

—"Engineering," BBC Summary of World Broadcasts, 30 July 1980, in Lexis-Nexis Academic Universe, 30 July 1980, <http://web.lexis-nexis.com>.

16 July 1980

Prime Minister Indira Gandhi tells Lok Sabha (lower house of parliament) that the fuel and heavy water bottlenecks that stand in the way of the successful implementation of India's nuclear power program will be resolved. Unlike the Tarapur station, which is dependent on the supply of enriched uranium from the United States, other nuclear power stations in Rajasthan and Madras will use indigenously mined and processed natural uranium fuel. The Indian government is also planning to achieve self-sufficiency in the production of heavy water. The heavy water plant at Baroda, which was shut down in 1977 after an accident, is expected to resume production in July 1980. Similarly, the Tuticorin plant, which faced shutdowns due to interruptions in the supply of power and gas, is being modified to ensure sustained production.

—"Nuclear Energy," BBC Summary of World Broadcasts, 30 July 1980; in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

17-18 July 1980

During the debate in Parliament, Congress Party member V.Chaturvedi calls on the government to develop India's nuclear capability and acquire nuclear weapons from other countries if necessary. Congress Party member V.N.

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Gadgil says India should revise its defense strategy due to Pakistan's attempts to develop nuclear weapons. H.K.L. Bhagat says that India has "no option" but to develop nuclear weapons since China already has them and Pakistan's attempts to acquire them. The representative of the opposition Bharatiya Janata Party (BJP) Atal Bihari Vajpayee says that in case Pakistan builds nuclear weapons, India will also have to consider developing them to keep its options open.

—James Hatton "Urge Development of India Nuclear Capability," Associated Press, 18 July 1980; in Lexis-Nexis Academic Universe, 18 July 1980, <http://web.lexis-nexis.com>.

August 1980

A spokesman of India's Department of Atomic Energy tells *Nuclear Fuel* that India has indigenous uranium resources of 53,000 tons "of which 30,000 tons are reasonably assured and 23,000 tons are estimated." According to the spokesperson, India expects to have 5,000MW of heavy water reactor capacity by the turn of the century. India currently has only one uranium production site at Jaduguda, Bihar. The most promising of the recent discoveries is Bodel in Madhya Pradesh where "a uraniferous zone over a strike length of 990 meters with an average thickness of 1.2 meters" was discovered. Approximately 90 tons of uranium ore have been mined at Bodel to date yet feasibility study of long-term investment is still in progress.

—"India Sees No Problems in Fuel Supply Whether or Not US Cuts Off Exports," *Nuclear Fuel*, 1 September 1980, p. 9.

August 1980

Prime Minister Indira Gandhi informs Parliament that completion of the two reactor units at Narora, originally scheduled for commissioning in 1981 or 1982, is at least three years behind schedule. Gandhi remarks that the delay is being caused by "design modifications and improvements not originally contemplated [and by] delay in manufacturing some critical nuclear equipment."

—Pearl Marshall "Two Reactors are Being Built at a Dangerous Site in India," *Nucleonics Week*, 30 October 1980, p. 4.

1 August 1980

Minister of External Affairs P.V. Narasimha Rao says in parliament that Pakistan's attempts to develop nuclear weapons will serve to increase tensions in South Asia.

—"Pakistan: Nuclear Research for Peaceful Purposes Only," BBC Summary of World Broadcasts, 5 August 1980, in Lexis-Nexis Academic Universe, 5 August 1980, <http://web.lexis-nexis.com>.

3 August 1980

In response to Indian foreign minister Rao's statement alleging that Pakistan is developing a nuclear weapons program, Pakistan's foreign office states that Pakistan's nuclear research program is solely for peaceful purposes; that Pakistan has no intentions of developing nuclear weapons. The spokesperson reiterates Pakistan's proposals regarding the establishment of a nuclear-weapon-free zone in South Asia, expressing the hope that India will respond positively. Other Pakistani proposals are as follows: First, India agrees to the establishment of the nuclear weapon free zone in South Asia. Second, both India and Pakistan open their nuclear installations to international inspections or agree to mutual inspection of each other's facilities. Third, both countries sign the Nuclear Non-

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Proliferation Treaty. Fourth, both countries renounce the manufacture or acquisition of nuclear weapons.

—"Pakistan: Nuclear Research for Peaceful Purposes Only," BBC Summary of World Broadcasts, 5 August 1980, in Lexis-Nexis Academic Universe, 5 August 1980, <http://web.lexis-nexis.com>.

4 August 1980

India once again rejects Pakistan's proposal to establish a nuclear-free zone in South Asia. An Indian Ministry of External Affairs (MEA) says Pakistan first suggested the idea in 1974, "without prior consultations with India or any other country in the region...there's nothing new in the proposal made by Islamabad." The spokesperson reiterates that the nuclear-free zone should be a distinct geographical area, "but South Asia is only a sub-region of a wider region, making the Pakistani idea an unpractical suggestion."

—"India Rejects Nuclear-Free Zone in South Asia," Associated Press, 4 August 1980; in Lexis-Nexis Academic Universe, 4 August 1980, <http://web.lexis-nexis.com>.

7 August 1980

Prime Minister Indira Gandhi alleges in parliament that Pakistan intends building nuclear weapons, and some countries were willing to help it achieve that goal.

—International News, Associated Press, 7 August 1980, in Lexis-Nexis Academic Universe, 7 August 1980, <http://web.lexis-nexis.com>.

7 August 1980

Addressing a parliamentary consultative committee, Prime Minister Indira Gandhi says that surveys carried out by the atomic minerals division of the Department of Atomic Energy (DAE) have revealed uranium deposits in different parts of India. She says that aggregate installed capacity of five heavy water plants at Nangal, Baroda, Tuticorin, Talcher and Kota is approximately 315 tons per year. Addressing Rajya Sabha (upper house of parliament), Gandhi says the heavy water plant at Nangal is already operating while the plant at Talcher will begin producing heavy water in June 1981.

—"Uranium and Heavy Water," BBC Summary of World Broadcasts, 20 August 1980; in Lexis-Nexis Academic Universe, 20 August 1980, <http://web.lexis-nexis.com>.

18 August 1980

In an address to parliament, Prime Minister Indira Gandhi says her government is taking steps to ensure continuous operation of Tarapur Atomic Power Station (TAPS) even if the United States stops fuel supplies. She says that investigations into mixed oxide fuel are under way; yet it is premature to discuss the results of those investigations.

—International News, Associated Press, 18 August 1980, in Lexis-Nexis Academic Universe, 18 August 1980, <http://web.lexis-nexis.com>; "India Sees No Problems in Fuel Supply Whether or Not US Cuts Off Exports," *Nuclear Fuel*, 1 September 1980, p. 9.

Fall 1980

Indian defense officials begin negotiations with the Soviet Union for technical assistance in the construction of a nuclear submarine.

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—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 249.

September 1980

The head of the Department of International Relations at the Committee for the Utilization of Atomic Energy (CUAE) in Moscow Georghu Afonin says that relations with India on nuclear reactor sales are "very positive." When asked whether the Soviet Union will supply fuel for India's Tarapur Atomic Power Station (TAPS), Afonin says that the USSR supplies fuel "only to those countries where atomic power stations have been constructed with Soviet assistance." India's Atomic Energy Commission (AEC) Chairman Homi Sethna is scheduled to visit in Moscow in October.

—"The USSR and India are Likely to Discuss Joint Marketing of Reactors," *Nucleonics Week*, 25 September 1980, p. 5.

September 1980

US congressional opponents of the enriched uranium export deal with India claim that India has probably stockpiled enough enriched uranium to continue running the Tarapur plant at least until February 1982. The assessment of the alleged Indian stockpile is made on the basis of data complied by the Nuclear Regulatory Commission (NRC) on the Tarapur plant's operating history. A senate source says India's decision to stockpile fuel in excess of its operational requirements contravenes the Indo-US agreement. Opponents of the deal also downplay the State Department's argument that continued shipments of enrichment uranium are necessary to avoid disrupting operations at the Hyderabad-based nuclear fuel fabrication facility, on grounds that since the facility did not exist when the fuel supply agreement was drawn up in 1963, it should not now be part of any consideration.

—"Indian Stockpile Disturbs Congressional Opponents of Tarapur Fuel Supply," *Nucleonics Week*, 18 September 1980, pp. 9-10.

11 September 1980

The Foreign Relations committees of both houses of the US Congress vote against the sale of enriched uranium for India's Tarapur Atomic Power Station (TAPS). Responding to this development, the spokesperson of India's Ministry of External Affairs J.N. Dixit calls on the United States to fulfill its obligations under the 1963 agreement and immediately supply 38 tons of enriched uranium to India. However, in case the United States fails to live up to its obligations, India is "prepared to meet any eventuality," Dixit adds.

—"Calls on US to Fulfill Treaty Obligations," Associated Press, 11 September 1980; in Lexis-Nexis Academic Universe, 11 September 1980, <http://web.lexis-nexis.com>; "India Reacts Calmly to Setback in US on Atom Fuel," *New York Times*, 12 September 1980; in Lexis-Nexis Academic Universe, 12 September 1980, <http://web.lexis-nexis.com>.

19 September 1980

The US House of Representatives votes 298-98 against shipping enriched uranium to India.

—"India Welcomes US Nuke Fuel Vote," Associated Press, 25 September 1980, in Lexis-Nexis Academic Universe, <http://web.lexis-nexis.com>.

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22 September 1980

India's ambassador-designate to the United States K.R. Narayanan says that US failure to fulfill its obligations under the 1963 agreement "will have an impact" as Indian people are likely question "why an agreement we have signed with a great country is not honored."

—"Says US Expected to Honor Uranium Agreement," Associated Press, 22 September 1980; in Lexis-Nexis Academic Universe, 22 September 1980, <http://web.lexis-nexis.com>.

24 September 1980

The US Senate votes 48-46 in favor of shipping enriched uranium to India's Tarapur Atomic Power Station (TAPS). India applies for a license for a third shipment of 19.8 tons of low-enriched uranium in March 1981. A spokesperson of India's Ministry of External Affairs (MEA) says that India's position on the issue of full-scope safeguards was reiterated repeatedly and "there is no change in that stand." He adds that talks on disposal of the Tarapur spent fuel are in progress.

—"India Welcomes US Nuke Fuel Vote," Associated Press, 25 September 1980; in Lexis-Nexis Academic Universe, 25 September 1980, <http://web.lexis-nexis.com>; "India Seeks License for More Tarapur Exports and Repudiates White House on Safeguards," *Nuclear Fuel*, 29 September 1980, pp. 1-2; "Barrier to US Sale if Nuclear Fuel to India Removed," Xinhua General Overseas News Service, 25 September 1980; in Lexis-Nexis Academic Universe, 25 September 1980, <http://web.lexis-nexis.com>.

October 1980

The Indian Navy remains divided over the question of nuclear submarine acquisitions from the Soviet Union. Opponents of the proposal argue that such acquisitions will increase India's dependence on the Soviet Union. Chief of Naval Staff Admiral Pereira reportedly remarks to his deputy R. Tahliani that it is premature for the IN to go for nuclear submarines when it still hasn't mastered the technology to build conventional submersibles.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), p. 249.

October 1980

The Principal physicist at Reactor Research Center (RRC) at Kalpakkam G. Venkataraman says that a design for a 250MW to 500MW fast breeder reactor is expected to be completed by 1986 or 1987. He remarks that the 40MW fast breeder test reactor (FBTR), which is in the final stages of development at the center, will serve as "a test-bed for carrying out various scientific and engineering experiments which will give [India] complete mastery of fast breeder technology." According to the officials from the Department of Atomic Energy (DAE), "the civil works for the French-assisted FBTR have been completed and the power and control systems are nearing completion. Electrical work is 80 percent complete and piping work 20 percent complete. The fabrication of the rotating plugs of the reactor assembly is nearing completion. The steam turbine is in the advanced stage, components for the mechanical sodium pumps have been fabricated, and the assembly of the primary pump has been completed." The RRC has initiated an evaluation of dissociating gases as potential reactor coolants along with the work on the core design of a 500MW sodium-cooled fast breeder reactor.

—Pearl Marshall "Indians Detail Progress on Breeder Development," *Nucleonics Week*, 9 October 1980, p. 12.

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October 1980

India's Atomic Energy Commission (AEC) recommends that India's fifth nuclear power plant be located at Kakrapar on the Tapi River, about 60 miles from Surat in the state of Gujarat. The location is still subject to final government approval. The station will include four 235MW reactors and is expected to add 940MW to India's current 1,800MW nuclear power capacity. At present, India has three commercial nuclear power reactors operating at a total capacity of 640MW, equivalent to 2.5 percent of India's total installed power capacity. —"India's Fifth Nuclear Power Station is to Be Sited at Kakrapar," *Nucleonics Week*, 16 October 1980, p. 12.

October 1980

Unit 2 of the Rajasthan Atomic Power Station (RAPS) goes critical. The unit was originally scheduled for commissioning in 1975. —"India's Fifth Nuclear Power Station is to Be Sited at Kakrapar," *Nucleonics Week*, 16 October 1980, p. 12.

October 1980

Indian nuclear expert Dharendra Sharma says that the twin 235MW nuclear power reactors at Narora are located in "a high seismic zone, only 50km from the active Moradabad earthquake fault." A nuclear accident could result in radioactive spillage into the Ganges river which passes through three of India's most populous states before flowing into the Bay of Bengal. Sharma remarks that Bhabha Atomic Research Center's (BARC) Environmental Group "refused to clear Narora because it is in an earthquake zone." —Pearl Marshall "Two Reactors are Being Built at a Dangerous Site in India," *Nucleonics Week*, 30 October 1980, p. 4.

Late October 1980

The Indian Navy organizes a Commanders Conference at the port of Vishakhapatnam. The conference is attended by all three chiefs of staff of the armed services, the Vice Chief of Naval Staff Tahlani, and the flag officers commanding India's fleets. During conference proceedings, Chief of Naval Staff Admiral Pereira opposes the proposal to build nuclear submarines. However, his deputies demur in favor of exploring the option. —Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 249-250.

5 October 1980

The first consignment of the US-supplied enriched uranium arrives in India; it is immediately rushed to the nuclear fuel fabrication facility in Hyderabad to be converted into fuel bundles for the Tarapur Atomic Power Station (TAPS). The second consignment is expected to arrive on October 8. —"First Enriched Uranium from US Arrives," Associated Press, 7 October 1980; in Lexis-Nexis Academic Universe, 7 October 1980, <http://web.lexis-nexis.com>.

22 October 1980

India's fifth heavy water plant near Kota in Rajasthan is expected to begin operations by the end of 1981. The plant is expected to produce 100-tons of heavy water annually.

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—"Heavy Water," BBC Summary of World Broadcasts, 22 October 1980; in Lexis-Nexis Academic Universe, 22 October 1980, <http://web.lexis-nexis.com>.

29 October 1980

During his visit to Moscow, the Chairman of Atomic Energy Commission (AEC) Homi Sethna discusses the prospects of Indo-Soviet cooperation in the nuclear field.

—"USSR- Nuclear Cooperation," BBC Summary of World Broadcasts, 12 November 1980; in Lexis-Nexis Academic Universe, 29 October 1980, <http://web.lexis-nexis.com>.

November 1980

Chief Scientific Advisor to the Indian government Dr. Raja Ramanna leads a team to the Soviet Union to explore the prospects of acquiring a nuclear submarine. The Indian Navy (IN) is represented by the Commander-in-Chief of the Eastern Command, Vice Admiral Mihir Kumar Roy. The Soviets offer India a Victor-class nuclear submarine for sale. However, the Indian team expresses an interest in acquiring Charlie-class submarines. In order to paper differences between the IN and the Indian atomic energy establishment, the team members decide that Dr. Raja Ramanna will file the sole trip report to Prime Minister Indira Gandhi on their return to India.

—Raj Chengappa, "Do You Want Our Skulls Cracked," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000), pp. 250-251.

November 1980

General Electric files an application with the US Nuclear Regulatory Commission (NRC) for a license to supply \$2 million worth of replacement parts for India's Tarapur Atomic Power Station (TAPS). The parts include "in-core detectors, control rod drive parts, shroud head bolts and a feed water sparger to replace cracked unit."

—"India's Tarapur Units are in Serious Despair," *Nucleonics Week*, 2 July 1981, p. 3.

20 November 1980

Addressing parliament, Minister of State for Science and Technology C.P.N. Singh says India will use mixed-oxide fuel if the United States delays further shipments of enriched uranium for Tarapur Atomic Power Station (TAPS). Singh remarks that uncertainties with fuel supplies led to a reduction in power generation at TAPS. Singh also urges the United States to clear an "overdue shipment" of 19.8 tons of enriched uranium which India ordered in August 1979.

—International News, Associated Press, 20 November 1980; in Lexis-Nexis Academic Universe, 20 November 1980, <http://web.lexis-nexis.com>.

December 1980

The Chairman of India's Atomic Energy Commission (AEC) Homi Sethna refutes statements that Narora nuclear power reactors are located in highly seismic zone. Sethna remarks that "Narora site is prone to seismic disturbances but it is so in the case of a large part of Indo-Gangetic Plain. If we were to avoid building nuclear power stations in this entire area, clearly this source of energy would not be available in this populous part of the country." He adds that the reactors have been designed with enormous care to meet safety requirements.

—"Defending the Siting of India's Twin 235MW Reactors at Narora," *Nucleonics Week*, 18 December 1980, p. 6.

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December 1980

India indicates that it will begin reprocessing spent fuel from its nuclear power reactors at the 100 ton per year Tarapur reprocessing plant near Bombay. The plant has been idle since 1976 because of India's failure to reach a "joint determination" with the United States on how to proceed with the disposal of the spent fuel from the Tarapur Atomic Power Station (TAPS). However, it is not clear whether India will reprocess fuel from the Rajasthan Atomic Power Station (RAPS) or the TAPS facility. An Indian nuclear industry source indicates that India has made "subsidiary arrangements" with the International Atomic Energy Agency (IAEA), which have made reprocessing possible; India need not go through the United States on a "case-by-case" basis. However, US government sources believe that India cannot reprocess spent fuel from the Tarapur facility without US consent.

—"India Claims Unilateral Right to Preprocess US-Origin Fuel," *Nucleonics Week*, 18 December 1980, pp. 1-2.

4 December 1980

In an address to parliament, Prime Minister Indira Gandhi says the nuclear fuel complex at Hyderabad is in the process of expansion from its current capacity of 100 tons of finished fuel a year to 210 tons a year at a cost of 130 million rupees. Gandhi also remarks that under the 1963 agreement, the United States is obliged to supply enriched uranium for the Tarapur Atomic Power Station (TAPS) as India is precluded from using fuel from any other source at TAPS.

—"Production and Transport, Nuclear Energy," BBC Summary of World Broadcasts, 17 December 1980, in Lexis-Nexis Academic Universe, 17 December 1980, <http://web.lexis-nexis.com>.

11 December 1980

India and the Soviet Union issue a joint declaration, stating that both countries are "firmly convinced that the task of highest priority facing the world today is the cessation of the arms race, above all in nuclear weapons... [and] call for early measures for the complete and general prohibition of nuclear weapon tests..."

—International News, Associated Press, 11 December 1980; in Lexis-Nexis Academic Universe, 11 December 1980, <http://web.lexis-nexis.com>.

18 December 1980

Unit 1 of the Rajasthan Atomic Power Station (RAPS-1) is shut down after a fuse blowout in the "unit's isolation damper circuit went unattended...leading to a buildup of pressure in the reactor building," which in turn triggered the "emergency core cooling system, dumping hundreds of thousands of gallons of water in the reactor."

—"Indian Officials Remain Very Close-Mouthed about an Incident at RAPS-1," *Nucleonics Week*, 26 February 1980, p. 3.

1980-1981

The Joint Planning Committee (JPC) comprising heads of operations directorates in the three armed services produce a paper outlining the Indian military's demand for nuclear weapons. The paper is sent by the Chiefs of Staff Committee (COSC) to the defense ministry. However, the paper is apparently not forwarded to the government.

—Bharat Karnad, "Hesitant Nuclear Realpolitik: 1966-To Date," *Nuclear Weapons and Indian Security: The Realist Foundations of Strategy* (New Delhi: Macmillan, 2002), p. 350.

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1979-1978

1979

India is designated a member of the International Atomic Energy Agency's (IAEA's) Board of Governors for the 23rd year in a row since the inception of the agency. The basis for this appointment is India's standing as one of the nine-member countries most advanced in the field of atomic energy.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.52.

January 1979

The Tuticorin Heavy Water Plant in Tamil Nadu commences production for a short period of time and then is shut down again due to a defect in the ammonia plant of M/s Southern Petrochemicals

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.4; Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.6.

28 February 1979

The total number of personnel at the Bhabha Atomic Research Centre (BARC) in Trombay is 12, 380. This number comprises 3,317 scientific, 5405 technical, 1,216 administrative, and 2,442 general maintenance and auxiliary staff.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," pp. 42-43.

23 March 1979

The U.S. Nuclear Regulatory Committee (NRC) approves the export of 18.5 tons of slightly enriched uranium to fuel the Tarapur Atomic Power Station (TAPS) in Trombay. Chairman Joseph M. Hendrie concludes that "India met the requirements set out in US legal provisions aimed at curbing the spread of nuclear weapons." (The vote was 3 to 2 to approve this export license).

—*The New York Times*, Information Bank Abstracts, 24 March 1979, in Lexis-Nexis Academic Universe, 24 March 1979, <http://web.lexis-nexis.com>; George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.218.

March-June 1979

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for its sixth refueling outage, which lasts 88 days.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.9; Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.7.

April 1979

The Tuticorin Heavy Water Plant in Tamil Nadu is restarted after being shut down for three months due to a defect in the ammonia plant of M/s Southern Petrochemicals.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.6.

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April 1979

Indian Foreign Minister Atal Behari Vajpayee visits Washington, DC and holds a series of meetings with top-ranking American officials, including President Carter. Vajpayee presses the United States to do more to stop Pakistan's acquisition of nuclear weapon capability.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.218.

May 1979

Heavy water production resumes at the Tuticorin Heavy Water Plant.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.6.

4 May 1979

India reviews its defense position in light of reports that Pakistan plans on developing a nuclear explosive capability. The Indian government cautions that this review should not be interpreted as a move away from India's earlier categorical renunciation of atomic weapons.

—*The New York Times*, Information Bank Abstracts, 4 May 1979, in Lexis-Nexis Academic Universe, 4 May 1979, <http://web.lexis-nexis.com>.

27 May 1979

The Carter Administration promotes the idea of a "nuclear-free zone" in an effort to avert a nuclear arms race between India and Pakistan. U.S. officials say that this proposal, which would be backed by security guarantees from the United States, Soviet Union, and China, calls for India and Pakistan to renounce the acquisition of nuclear weapons and to accept international safeguards on all existing nuclear facilities.

—*The New York Times*, Information Bank Abstracts, 27 May 1979, in Lexis-Nexis Academic Universe, 27 May 1979, <http://web.lexis-nexis.com>.

July 1979

Prime Minister Morarji Desai government falls due to internecine political conflict. As a result, leaders of numerous political factions engage in a free-for-all to supplant him. Desai is succeeded by the 77 year old-Choudhary Charan Singh, the head of a rival political party.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.220.

16 August 1979

Indian Prime Minister Choudhary Charan Singh warns that India might be forced to amass nuclear weapons if Islamabad goes ahead with efforts to assemble an atomic bomb.

—*The New York Times*, Information bank Abstracts, 16 August 1979, in Lexis-Nexis Academic Universe, 16 August 1979, <http://web.lexis-nexis.com>.

28 November 1979

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station is shut down for its sixth refueling

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outage.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.7.

December 1979

The Zirconium Oxide Plant located at the Nuclear Fuel Complex (NFC) in Hyderabad is shut down because of a power shortage.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.8.

December 1979

The Zirconium Sponge Plant located at the Nuclear Fuel Complex (NFC) in Hyderabad is shut down.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.8.

4 December 1979

In a speech to the 23rd General Conference of the International Atomic Energy Agency (IAEA), Prime Minister Singh charges that "efforts to limit the spread of nuclear weapons thwart the peaceful development goals of poorer countries while leaving nuclear powers free to add to their arsenal."

—*The New York Times*, Information Bank Abstracts, 5 December 1979, in Lexis-Nexis Academic Universe, 5 December 1979, <http://web.lexis-nexis.com>.

5 December 1979

Sigvard Eklund, Director General of the International Atomic Energy Agency (IAEA), says that "when a developing country invests up to a billion dollars in a nuclear power plant, as India did with the Tarapur plant, it can legitimately expect an uninterrupted supply of fuel during the lifetime of the plant, provided it accepts a nuclear control treaty or comparable safeguards."

—*The New York Times*, Information Bank Abstracts, 5 December 1979, in Lexis-Nexis Academic Universe, 5 December 1979, <http://web.lexis-nexis.com>.

10 December 1979

India signs a protocol with Poland, which calls for cooperation between the two countries in the peaceful utilization of atomic energy during 1980-1981.

—Department of Atomic Energy, Government of India, "Annual Report: 1979-1980," p.52.

1978

India is designated as a member of the International Atomic Energy Agency's (IAEA's) Board of Governors (BOG) for the 22nd year in succession since the formation of the Agency. This appointment is based on India's standing as one of the nine member countries most advanced in the field of atomic energy.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.60.

1-2 January 1978

US President Jimmy Carter travels to New Delhi for a two-day visit. During this visit, Carter and Indian Prime Minister Morarji Desai issue the "Delhi Declaration," which reaffirms their commitment to democracy, national sovereignty, a more equitable international economic order, and the reduction and eventual elimination of nuclear

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weapons.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) pp.210-211.

3 January 1978

President Carter discloses that he and Indian Prime Minister Desai had sharply disagreed over US demands that India accept safeguards aimed at ensuring American-supplied nuclear fuel be used for peaceful purposes. However, Carter writes a letter to the Indian parliament, in which he says that the United States will continue its shipments of nuclear fuel to India for use in its power reactors.

—*The New York Times*, Information Bank Abstracts, 3 January 1978, in Lexis-Nexis Academic Universe, 3 January 1978, <http://web.lexis-nexis.com>.

7 January 1978

The employees' strike at the Rajasthan Atomic Power Station (RAPS) comes to an end. The maintenance work on the Unit-1 pressurized heavy water reactor (PHWR) resumes.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.95.

10 January 1978

British Prime Minister James Callaghan states that India may accept 'full scope safeguards' for its nuclear plants without signing the nuclear nonproliferation treaty (NPT) if the nuclear powers agree to ban tests and destroy all of their stockpiles.

—*The New York Times*, Information Bank Abstracts, 10 January 1978, in Lexis-Nexis Academic Universe, 10 January 1978, <http://web.lexis-nexis.com>.

13 January 1978

Prime Minister Desai reiterates India's objections to full international inspections of its nuclear installations. He also says that "India's acceptance of safeguards will depend on basic disarmament agreement among the nuclear powers."

—*The New York Times*, Information Bank Abstracts, 13 January 1978, in Lexis-Nexis Academic Universe, 13 January 1978, <http://web.lexis-nexis.com>.

20 January 1978

In a news conference, US Representative Lester Wolff, says that Indian Prime Minister Morarji Desai has accepted an invitation to address the US Congress on the "nuclear issue," in May. Wolff also states that Desai has also offered to act as a "buffer," in the disarmament talks (particularly in the nuclear field) between the United States and the USSR.

—*The New York Times*, Information Bank Abstracts, 21 January 1978, in Lexis-Nexis Academic Universe, 21 January 1978, <http://web.lexis-nexis.com>.

February 1978

At the present time, the Bhabha Atomic Research Center (BARC) in Trombay employs a staff of 3,172 scientists, 5,281 technicians, 1,198 administrators, and 2,342 maintenance and auxiliary personnel.

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—George Perkoivch, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.213.

28 February 1978

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) comes back online after it was shut down for refueling in December 1977.

—The Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.93.

10 March 1978

The US Congress moves to tie the Carter administration's hands in dealing with India by passing the Nuclear Non-Proliferation Act (NNPA). This long and complicated legislation is the culmination of several years of intense intergovernmental debate informed by numerous official and nongovernmental studies. The Act restricts the export of sensitive nuclear material, including enriched uranium fuel, only to countries, which place all such facilities under the International Atomic Energy Agency's (IAEA) full scope safeguards.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.206; Raj Chengappa, "Hello, Mr Bomb," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p.223.

24 March 1978

Indian Prime Minister Desai states that India is considering alternatives to its dependence on US imports of enriched uranium, in order to fuel its atomic power station in Tarapur. There have been considerable delays in the shipments of enriched uranium from the US to India and many members of the Indian Parliament believe this is due to India's refusal to sign the Nuclear Non Proliferation Treaty (NPT).

—*The New York Times*, Information Bank Abstracts, 24 March 1978, in Lexis-Nexis Academic Universe, 24 March 1978, <http://web.lexis-nexis.com>.

April 1978

The 'Stainless Steel Tube Plant' is commissioned at the Nuclear Fuel Complex (NFC) in Hyderabad.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.4

1 April-19 September 1978

The Unit-1 pressurized heavy water reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is shut down.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.4.

25 April 1978

Prime Minister Desai says that if President Jimmy Carter does not reverse the decision by the US Nuclear Regulatory Commission (NRC) to block shipments of enriched uranium to India, this will "be a breach of the '66 agreement between the two countries and will free India to adopt any course it chooses to safeguard its own interests."

The New York Times, Information Bank Abstracts, 25 April 1978, in Lexis-Nexis Academic Universe, 25 April 1978, <http://web.lexis-nexis.com>.

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27 April 1978

The US Nuclear Regulatory Commission (NRC) takes a tough line against India by refusing to license the next shipment of fuel for the Tarapur Atomic Power Station (TAPS). In response, US President Jimmy Carter uses his presidential authority to overturn the NRC's decision explaining that it seriously undermines his government's efforts to persuade India to observe the Nuclear Non-Proliferation Act's (NNPA) deadline of March 1980.

—Raj Chengappa, "Hello, Mr. Bomb," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p.223.

28 April 1978

US President Jimmy Carter orders the sale of over eight tons of enriched uranium to India for use in the Tarapur Atomic Power Station (TAPS). Furthermore, in a message to the US Congress, the President declares that "to deny a sale would hurt the prospects for getting India to accept stricter nuclear safeguards and other US nonproliferation goals." He also points out that the Nuclear Non-Proliferation Act of 1978 (NNPA) allows shipments for a two-year period during which the US can try to reach agreement with recipient countries for safeguards.

—*The New York Times*, Information Bank Abstracts, 28 April 1978, in Lexis-Nexis Academic Universe, 28 April 1978, <http://web.lexis-nexis.com>.

June 1978

Dr. Raja Ramanna, Director of the Bhabha Atomic Research Center (BARC), is transferred from BARC to New Delhi, where he is named secretary of defense research, scientific adviser to the defense minister, and director general of the Defence Research and Development Organization (DRDO). This order for a transfer is mainly based on Prime Minister Desai's mistrust of the pro-explosives leadership at BARC.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.214.

9 June 1978

Prime Minister Desai delivers an address before a special session of the UN General Assembly in which he reaffirms his pledge "not to manufacture or acquire nuclear weapons even if the rest of the world did so." More boldly, he restates that India "abjured nuclear explosions even for peaceful purposes."

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.211.

13 June 1978

US President Carter meets privately with Indian Prime Minister Desai and both leaders reaffirm their positions on the nuclear export dispute, and Carter restates his ultimate goal of eliminating nuclear weapons.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.211.

14 June 1978

President Carter and Prime Minister Desai meet again along with their top foreign policy officials. One of the topics that they address is the consideration of nuclear arms control. President Carter explains some of the detailed

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challenges remaining in the nuclear test ban negotiations, including the need to ensure that nuclear weapon stockpiles remain reliable until they are eliminated.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.212.

14 June 1978

Prime Minister Desai reveals an outlook (during the meeting), that no doubt bedevils the Indian nuclear establishment. He says that "uncertainty on the reliability of stockpiles might be a good thing."

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.212.

17 June 1978

Former Prime Minister Indira Gandhi criticizes the Janata Party's (political party in power) decision to abjure nuclear explosions even for peaceful purposes.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.213.

20 June 1978

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for its fifth refueling outage.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.9.

July 1978

The Tuticorin Heavy Water Plant located in Tamil Nadu, commences heavy water production.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.4

July 1978

India signs a "memorandum of understanding" on cooperation for peaceful uses of nuclear technology with Libya. The protocol includes providing Libya with the necessary technology for nuclear power generation.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.60; Raj Chengappa, "Hello Mr Bomb," *Wepaons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publshers India, 2000) p.224.

26 July 1978

In two addresses to parliament, Morarji Desai rebuffs charges that his no test position is halting nuclear research. However, in doing so he betrays some technical confusion, arguing that "blasts" for "purposes of mining or water purposes or oil purposes" could be allowed but that "explosions" like the one at Pokhran were unnecessary and would not be sanctioned as long as he is prime minister.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.214.

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28 July 1978

Prime Minister Desai says that while India is opposed to nuclear explosions, he will not rule out the use of nuclear energy for mining purposes.

—*The New York Times*, Information Bank Abstracts, 28 July 1978, in Lexis-Nexis Academic Universe, 28 July 1978, <http://web.lexis-nexis.com>.

31 July 1978

Prime Minister Desai makes a statement to the Rajya Sabha [upper house of parliament] in which he emphasizes that Pokhran had caused the severe difficulties India now faced in maintaining international cooperation for nuclear research and development. He also notes that "the main countries in which nuclear research is taking place are moving away from peaceful nuclear explosions." Furthermore, Desai urges the Rajya Sabha to see nuclear policy "in the broader perspective of our traditions, our spiritual and moral values and our passion for peace."

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.214.

27 August 1978

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is synchronized to the grid. The fifth refueling of the reactor is completed in a record time of 68 days, the shortest time so far.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p.9.

12 September 1978

The USSR proposes a treaty at the United Nations (UN) that offers guarantees against a nuclear attack to countries without nuclear weapons. This treaty would also include countries not parties to the Non-Proliferation Treaty (NPT) such as India.

—*The New York Times*, Information Bank Abstracts, 12 September 1978, in Lexis-Nexis Academic Universe 12 September 1978, <http://web.lexis-nexis.com>.

20 September 1978

The Unit-1 pressurized heavy water reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is resynchronized to the grid, after being shut down for five months. The power output is brought up to 185MWe and efforts are on to reach full capacity before March 1979.

—Department of Atomic Energy, Government of India, "Annual Report: 1978-1979," p. 4.

December 1978

The United States and India agree to establish an ad hoc "Scientific Advisory Committee," to examine alternative approaches to safeguards and determine whether International Atomic Energy Agency (IAEA) safeguards impair the progress of nuclear energy programs. The committee will be comprised of an Indian, an American, and two third-party scientists and will be headed by the chairman if the IAEA.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.219.

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1977-1976

1977

India is designated to the International Atomic Energy Agency's (IAEA's) Board of Governors, for the 21st year in succession since the inception of the agency. India's inclusion in the board is based on its position as one of the nine most advanced member-countries in the area of nuclear technology.

—Department of Atomic Energy, Government of India, "Annual Report: "1977-1978," p.10.

1977

The Indian Atomic Energy Commission (AEC) begins work on the 100-MW R-5 (Dhruva) plutonium production reactor at the Bhabha Atomic Research Centre (BARC) in Trombay. This pressurized heavy water reactor (PHWR) is being built to supplement the smaller and aging Canadian-Indian Reactor, US (CIRUS) that produced plutonium used in the Pokhran blast.

—Geroge Perkovich, "The Nuclear Program Stalls," India's Nuclear Bomb: The Impact on Global Proliferation (Berkley, CA: University of California Press, 1999) p.201.

Early 1977

India seeks the remaining 75 percent of the 200-tons of heavy water that the Soviet Union committed to provide in September 1976. (Twenty-five percent was immediately shipped without a formal safeguards agreement.) The heavy water will help India start the second pressurized heavy water reactor at the Rajasthan Atomic Power Station (RAPS). The Soviet Union is demanding that India accept safeguards on the reactor in perpetuity, on any plutonium produced within it, and in whichever facilities this plutonium might be introduced. The aim is to ensure that the heavy water will not be diverted to help in the production of plutonium for explosive purposes.

—George Perkovich, "The Nuclear Program Stalls," India's Nuclear Bomb: The Impact on Global Proliferation (Berkeley, CA: University of California Press, 1999) p.201.

February 1977

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) achieves a monthly capacity factor of 94%, the highest in the last six years of operation.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.118.

3 February 1977

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for its fourth refueling and maintenance.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.118.

28 February 1977

As of this date, the total strength of the Bhabha Atomic Research Centre (BARC) in Trombay is 11,462. This total comprises of 3,007 scientific, 5,056 technical, 1,195 administrative and 2,204 general maintenance and auxiliary

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staff.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.79.

24 March 1977

India's new prime minister, Morarji Desai, addresses his first press conference in which he states that "...the government did not believe in nuclear weapons" and that he doubted "the necessity of peaceful nuclear explosions."

—George Perkovich, "The Nuclear Program Stalls," India's Nuclear Bomb: The Impact on Global Proliferation (Berkeley, CA: University of California Press, 1999) p.201.

29 March-23 April 1977

The Unit-1 Pressurized Heavy Water Reactor (PHWR) of the Rajasthan Atomic Power Station (RAPS) endures its first long shut down of the year. This shut down is due to the failure of moderator heat exchanger tubes.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.95.

April 1977

Prime Minister Desai tells a West German interviewer, "I will give it to you in writing that we will not manufacture nuclear weapons. Even if the whole world arms itself with the bombs we will not do so." He also says that if the internal pressure to build nuclear weapons became too strong, he would resign.

—George Perkovich, "The Nuclear Program Stalls," India's Nuclear Bomb: The Impact on Global Proliferation (Berkeley, CA: University of California Press, 1999) p.201.

April 1977

India participates in the International Conference on Transfer of Nuclear Technology held in Shiraz, Iran. This conference is organized by the Atomic Energy Organization of Iran.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," pp. 10, 109.

20 April 1977

Prime Minister Desai says that India will sign the nonproliferation treaty only if present nuclear powers destroy their arsenals. He also holds that India has no nuclear arms and that its technology is devoted to peaceful purposes.

—The New York Times, Information Bank Abstracts, 20 April 1977, in Lexis-Nexis Academic Universe, 20 April 1977, <http://web.lexis-nexis.com>.

20 April 1977

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is put back online. The refueling outage that began on February 3 was completed in a record period of 76 days, the shortest time so far.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.93.

May 1977

US President Jimmy Carter instructs the new US ambassador to India, Robert Goheen, to tell Indian Prime Minister Morarji Desai that "if India would restrain from developing atomic weapons and agree to discuss nonproliferation,

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he would clear the pending Tarapur fuel shipment. (The US Nuclear Regulatory Commission is holding up the transfer on nonproliferation grounds.)

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) pp. 201-202.

14 May-1 October 1977

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) achieves an uninterrupted run of 140 days at normal outputs. This is among the longest runs for large units in the country.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.8.

16 May 1977

Prime Minister Desai declares that if a peaceful nuclear explosion were necessary, India would do it, but openly. "We will not do it in hide and seek manner. We will tell the people [what] we are doing and let them come and witness, and the use will also be open equally to others," says Desai. He also says that "atomic weapons are no good for defence at all...they can't ever win a war."

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.201.

Summer 1977

The Desai government assents to the safeguards demand demanded by the Soviet Union earlier during the year as a precondition for the supply of heavy water.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.201.

Summer 1977

The Carter administration explores with India the possibility of purchasing excess spent fuel from Tarapur and returning it to the United States, which was allowed under the 1963 accord. However, logistical difficulties and opposition by US environmentalists doom this transaction.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press) p.208.

28 June 1977

The US Nuclear Regulatory Commission issues an export license authorizing shipment of reactor fuel to India. This is a result of the assurances given by Prime Minister Desai to President Carter that India will engage in nonproliferation-related discussions with the United States. More specifically, the commission approves the export of 5,573 lbs of uranium to refuel the nuclear power reactor at Tarapur.

--George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.202; *The New York Times*, The Information Bank Abstracts, 30 June 1977, in Lexis-Nexis Academic Universe, 30 June 1977, <http://web.lexis-nexis.com>.

July 1977

US President Jimmy Carter sends Deputy Secretary of State Warren Christopher to India in order to keep the

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pressure on India to keep its promise to restrain its nuclear weapons program and to engage in the nonproliferation debate.

—Raj Chengappa, "Hello, Mr. Bomb," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.221-222.

July 1977

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) achieves a monthly capacity factor of 95.1%, which is the highest since the commissioning of the reactor in 1969.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.8.

2 July 1977

The Unit-1 reactor of the Rajasthan Atomic Power Station (RAPS) is shut down for its annual maintenance. This is the second of two long shut downs of this unit during 1977.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," pp. 8, 95.

4 July 1977

Production of heavy water begins at the Baroda Heavy Water Plant in Gujarat.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.100.

13 July 1977

Prime Minister Desai participates in question time in the Lok Sabha [lower house of parliament] and denies that India has accepted full-scope safeguards and a ban on the reprocessing of spent fuel from all reactors, not only the two at Tarapur, in return for resumption of US fuel supplies.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.202.

13 July 1977

The prime minister is also asked whether India pledged not to undertake further peaceful nuclear explosions. He responds to this question by saying that "the explosion that was made here for peaceful purposes----as it was claimed--has been misunderstood. And, therefore, it created all these difficulties. There is no question of any other explosion now for peaceful purposes. And this has been cleared out in our talks. Therefore, this is not going to arise now."

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.202.

Mid-August 1977

The load capacity of the Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is reduced to about 65% capacity in order to stretch out the fuel cycles due to the shortage of spent fuel storage space. The reactor had been operating at over 90% capacity prior to this reduction.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.93.

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September 1977

The Uranium Oxide Plant located at the Nuclear Fuel Complex (NFC) in Hyderabad achieves full capacity.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.98.

8 September 1977

Employees of the Rajasthan Atomic Power Station (RAPS) go on strike. The maintenance work being done on the Unit-1 reactor (began on July 2) is left incomplete.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.95.

3 December 1977

A series of explosions and fire cause closure of the Boroda Heavy Water Plant in Gujarat. The Indian Atomic Energy Commission (AEC) says that 20 people are injured as a result of the explosions and fire and that the facility is closed indefinitely.

—The New York Times, Information Bank Abstracts, 5 December 1977, in Lexis-Nexis Academic Universe, 5 December 1977, <http://web.lexis-nexis.com>; Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.8.

5 December 1977

The Unit-2 Boiling Water Reactor (BWR) of the Tarapur Atomic Power Station (TAPS) is shut down for refueling.

—Department of Atomic Energy, Government of India, "Annual Report: 1977-1978," p.93.

22 December 1977

Prime Minister Desai continues his rejection of further nuclear explosions when he addresses the Rajya Sabha [upper house of parliament] and tells house members that India is committed "not to explode any nuclear device for peaceful purposes or make any nuclear weapons."

—George Perkovich, "The Nuclear Program Stalls," India's Nuclear Bomb: The Impact on Global Proliferation (Berkeley, CA: University of California Press, 1999) p.203.

1976

India is designated as a member of the International Atomic Energy Agency's (IAEA's) Board of Governors for the 20th year in succession since the inception of the Agency.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.132.

14 January 1976

In an address to the Pugwash Conference in Madras, Prime Minister Indira Gandhi rebuts criticism of India's 1974 nuclear explosion and says that that India will not give up further experiments in peaceful uses of nuclear energy.

—*The New York Times*, Information Bank Abstracts, 15 January 1976, in Lexis-Nexis Academic Universe, 15 January 1976, <http://web.lexis-nexis.com>.

31 January 1976

US Senator John Glenn reports that the Senate Government Operations committee is looking into charges that the General Electric (GE) supplied Boiling Water Reactors (BWR) at the Tarapur Atomic Power Station (TAPS), pose a

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major radioactive danger. Dr. Steven Hanauer of the US Nuclear Regulatory Commission (NRC) predicts that Tarapur is a candidate for major disaster.

—*The New York Times*, Information Bank Abstracts, 31 January 1976, in Lexis-Nexis Academic Universe, 31 January 1976, <http://web.lexis-nexis.com>.

1 February 1976

The total strength of the Bhabha Atomic Research Centre (BARC) in Trombay is 10,854 (as of this date) and comprises of 2,840 scientific, 4,859 technical, 1,187 administrative and 1,968 general maintenance and auxiliary staff.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.76.

8 February 1976

The Chairman of the Indian Atomic Power Authority, J.C. Shah, denies "radioactivity peril from the Tarapur power plant."

—*The New York Times*, Information Bank Abstracts, 8 February 1976, in Lexis-Nexis Academic Universe, 8 February 1976, <http://web.lexis-nexis.com>.

February 1976

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is shut down due to problems in the low pressure turbine. The Unit was resynchronized to the grid just two months earlier in December 1975.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.8.

10 March 1976

Canada agrees to resume nuclear aid to India based on a repeated Indian pledge that the three reactors to be supplied by Canada will not be used in developing an explosive device. An official source notes that the agreement does not prevent India from exploding a device after the nuclear aid project ends [It is ambiguous what the nuclear aid exactly refers to].

—*The New York Times*, Information Bank Abstracts, 10 March 1976, in Lexis-Nexis Academic Universe, 10 March 1976, <http://web.lexis-nexis.com>.

31 March 1976

A facility for reprocessing off-grade zircaloy scrap back to reactor grade zirconium sponge, adopting a pyro-metallurgical route is successfully commissioned at the Nuclear Fuel Complex (NFC) in Hyderabad. As of this date, nearly 18.379 tons of scrap has been reprocessed. Recycling is not practiced by any of the known sponge producers abroad.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.104.

3 April 1976

The US State Department continues to pursue "low-key" dialogue with the Indian Atomic Energy Commission (AEC) regarding India's adherence to the London Nuclear Suppliers Group guidelines covering exports of sensitive materials. Yet, as of the present time, India still has not responded to US Secretary of State Kissinger's private 1974

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proposal for serious dialogue on nuclear exports.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p.198.

12 April 1976

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is recommissioned after a shut-down of nearly two months for the replacement of some blades in the low pressure rotor.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.120.

April-May 1976

A delegation from the German Democratic Republic visits India to identify areas for cooperation in the peaceful uses of nuclear energy and to draw up a working plan.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.132.

April-June 1976

A total of 17.4 tons of depleted UO₂ powder is produced by the Nuclear Fuel Complex's (NFC) Uranium Oxide Plant in Hyderabad and is supplied to the Ceramic Fuel Fabrication Plant (CFFP) for meeting the initial charge requirements of the Unit-2 reactor at the Rajasthan Atomic Power Station (RAPS). The CFFP has already fabricated and supplied around 700 fuel assemblies containing depleted UO₂ for the start up of RAPS Unit-2.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.123.

April-August 1976

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) operates at 180-190 MW during this time period.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.118.

18 May 1976

Canadian Foreign Secretary Allan MacEachen announces that Canada has decided to make permanent its suspensions of nuclear cooperation with India. The nuclear cooperation between the two countries was suspended in May 1974, when India exploded a nuclear device made from plutonium from a small Canadian-supplied pilot reactor.

—*The New York Times*, Information Bank Abstracts, 19 May 1976, in Lexis-Nexis Academic Universe, 19 May 1976, <http://web.lexis-nexis.com>; *The New York Times (1857-Current file)* 19 May 1976, in ProQuest Historical Newspapers, The New York Times (1851-2003), 19 May 1976, <http://proquest.umi.com/pqdweb>.

20 May 1976

India assails Canada for having "turned its back," on a long-negotiated settlement of nuclear matters between the two countries. Foreign Minister Yeshwantaro B. Chavan addresses parliament and says that his government is "disappointed that after two years of strenuous negotiations, when a detailed understanding had been reached, the Canadian government should have unilaterally taken the step to terminate nuclear cooperation."

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—*The New York Times*, Information Bank Abstracts, 22 May 1976, in Lexis-Nexis Academic Universe, 22 May 1976, <http://web.lexis-nexis.com>.

20 June 1976

The Indian press agency- *Samachar*, reports that India is currently building two new plants for the purposes of recovering plutonium from nuclear reactor waste, and is also expanding its Plutonium Reprocessing Plant at the Bhabha Atomic Research Centre (BARC) in Trombay. India wants to expand its capacity to produce plutonium for use in breeder power reactors.

—*The New York Times*, Information Bank Abstracts, 20 June 1976, in Lexis-Nexis Academic Universe, 20 June 1976, <http://web.lexis-nexis.com>.

11 July 1976

The Chairman of the Indian Atomic Power Authority J.C. Shah suggests that India will have to consider alternative sources if the United States does not resume regular supplies of enriched uranium for the Tarapur Atomic Power Station (TAPS) in accordance with the 1963 agreement. The US Nuclear Regulatory Commission (NRC) has sent nine tons of enriched uranium, enough to last for six months. The shipments had been held up because of objections raised by environmentalists in the Tarapur area.

—*The New York Times*, Information Bank Abstracts, 11 July 1976, in Lexis-Nexis Academic Universe, 11 July 1976, <http://web.lexis-nexis.com>.

27 July 1976

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for its fourth refueling.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.118.

28 October 1976

US President Gerald Ford issues a major statement regarding a significant change in US nuclear policy. The change calls for halting reprocessing of spent fuel "unless there is sound reason to conclude that the world community can effectively overcome the associated risks of proliferation." Internationally, the United States will pursue strengthening of export controls, safeguards, and other measures to minimize the risks of proliferation. Thus, US nonproliferation policy will be tightened significantly.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) pp. 198-199.

October-November 1976

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) achieves a continuous outage-free operation during this time span. This is one example of the considerable improvement in the operation of RAPS Unit-1.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.120.

9 December 1976

US officials report that the USSR has informed the International Atomic Energy Agency (IAEA) that it will sell India

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200 tons of heavy water for use in its (India's) nuclear energy program. They also mention that the heavy water sold will be safeguarded.

—*The New York Times*, Information Bank Abstracts, 9 December 1976, in Lexis-Nexis Academic Universe, 9 December 1976, <http://web.lexis-nexis.com>.

December 1976

The load on the Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is reduced to a level of 135 MWe, due to the end-of-cycle fuel conditions.

—Department of Atomic Energy, Government of India, "Annual Report: 1976-1977," p.118.

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1975-1974

Early 1975

A group of scientists at the Bhabha Atomic Research Center (BARC) headed by M. Srinivasan is assembled to develop the technology required for making a boosted fission bomb as a step towards the H-bomb. The team also begins to accumulate lithium and tritium required for the fusion explosion. Prime Minister Indira Gandhi approves the project.

—Raj Chengappa, "The Wages of Armageddon," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.207.

1975

India is designated as a member of the International Atomic Energy Agency's (IAEA) Board of Governors for the 19th year in succession since the inception of the agency. This appointment is based on India's position as one of the nine most advanced member-countries in atomic energy-related technologies.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.113.

1975

India renews an agreement with Egypt for the development of atomic energy for peaceful purposes for a period of five more years.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.113.

1975

The plutonium reprocessing plant located at the Bhabha Atomic Research Center (BARC) in Trombay is shutdown thus constraining India's weapon potential.

—George Perkovich, "The Nuclear Program Stalls," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.191.

1975

K.P. Rao and N. Nanjundeswaran, two senior engineers at the Tarapur Atomic Power Station (TAPS), submit a

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report titled "Problems Associated with Nuclear Turbines at Tarapur." This report confirms 11 specific problems related to TAPS.

—Dhirendra Sharma, "Assessment Of Nuclear Technology: A Lesson Of Tarapur," *India's Nuclear Estate* (New Delhi, India: Lancers Publishers, 1983) p.67.

21 January 1975

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for refueling after operating at varying loads.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.7.

25 January 1975

The Canadian Department of Industry, Trade and Commerce officially cancels an export permit which covers an estimated \$1.5 million in nuclear-related material and equipment sales which were destined for use in the Unit-2 Heavy Water Reactor (HWR) at the Rajasthan Atomic Power Station (RAPS). The department already suspended all such sales back in May 1974 after India exploded its nuclear device.

—Facts on File: World News Digest, "India A-aid officially voided" 25 January 1975, in Lexis-Nexis Academic niverse, 25 January 1975, <http://web.lexis-nexis.com>.

5 February 1975

A mishap occurs on the Atlantic Ocean as equipment and materials from the West German firm-UHDE GmbH are being transferred to the site of the Talcher Heavy Water Plant in the Indian state of Orissa. The plant was expected to be completed by the end of 1976 but this schedule is now been adversely affected by the loss of the equipment which includes two towers.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," pp.133; *India Profile: Nuclear Facilities-Talcher Heavy Water Plant* (NTI website-India Nuclear Profile. www.nti.org).

April 1975

A plant for producing metallic potassium is commissioned at the Baroda Heavy Water Plant in Gujarat. This plant will supply the potassium requirements of the Heavy Water Plants based on the Ammonia-Hydrogen exchange process. The plant has a capacity of 30 tonnes per annum.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.105.

2 May 1975

The Unit-1 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is put back on line after being shut down for refueling. The refueling period of 101 days is the shortest so far achieved for refueling. Major works such as inspection of the main generator rotor (first since commissioning) were completed during the refueling process.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.100.

7 July 1975

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for refueling. The Unit load has to be restricted to 135-149 MWe before the refueling process can begin because of some

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problems.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.100.

22 July 1975

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is shut down due to the failure of some of the blades in stage III of the high pressure rotor of the turbine. The shut down is utilized for carrying out major works in other areas.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.102.

25 August 1975

US Intelligence reports that Egypt has "put out feelers" to New Delhi about the chances of getting help in developing nuclear weapons in order to deter Israeli nuclear capability.

—John A. Conway, Newsweek (US Edition) "Nukes on the Nile?" 25 August 1975, in Lexis-Nexis Academic Universe, 25 August 1975, <http://web.lexis-nexis.com>.

22-25 September 1975

Dr. H. N. Sethna, Chairman of the Atomic Energy Commission (AEC) and Secretary of the Department of Atomic Energy (DAE), leads an Indian delegation to Vienna. The delegation participates in the 19th regular session of the International Atomic Energy Agency (IAEA) General Conference.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.113.

19 October 1975

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is put back online after a shutdown of 104 days for refueling. During the refueling outage, the station staff successfully solve complicated problems involving a stuck control rod drive of the reactor control system.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p. 100.

November 1975

A new facility for the production of mixed pellets of gadolinium oxide and enriched uranium oxide commences production at the Nuclear Fuel Complex (NFC) in Hyderabad.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.104.

27 December 1975

The Unit-1 Pressurized Heavy Water Reactor (PHWR) at the Rajasthan Atomic Power Station (RAPS) is recommissioned after its major shut down back in July.

—Department of Atomic Energy, Government of India, "Annual Report: 1975-1976," p.102.

1974

India is designated as a member of the International Atomic Energy Agency's (IAEA's) Board of Governors (BOG) for the 18th year in succession since the inception of the Agency. The main reason for the appointment is India's position as one of the nine most advanced member-countries in the technology of atomic energy.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.14.

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Early 1974

India's nuclear test preparations gather momentum. A small group including P.N. Haksar, former principal secretary to the prime minister, D.P. Dhar, incumbent principal secretary, Dr. B.D. Nag Chaudhuri, scientific adviser to the defense minister, Homi Sethna, chairman of the Atomic Energy Commission (AEC), and Raja Ramanna, head of the nuclear test project, hold a series of undated meetings to decide on some of the critical decisions relating to the proposed nuclear test.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.174.

January 1974

Prime Minister Indira Gandhi lays the foundation stone for the Narora Atomic Power Station (NAPS), the fourth Atomic Power Station in the country. It will be located in the town of Narora in the state of Uttar Pradesh (UP).

—K.K Pathak, *Nuclear Policy of India: A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248.

6 February 1974

A special arrangement is concluded between the Department of Atomic Energy (AEC) and the Kernforschungsanlage Julich GmbH for implementation of the provisions contained in the existing bilateral agreement (signed October 1971) on cooperation between India and the Federal Republic of Germany in the peaceful uses of atomic energy and space research.

—Department of Atomic Energy, Government of India, "Annual Report: 1973-1974," p.167.

19 February 1974

The bomb team conducts a key experiment to validate M. Srinivasan's theoretical construct about neutron multiplication. Known as the approach to the criticality test, the experiment involves assembling the plutonium sphere and continuing the neutron activity generated prior to the implosion caused by the conventional explosives. In order to simulate the thickness of the conventional explosives, the team uses a cube of paraffin with a spherical hollow at the centre to fit the core.

—Raj Chengappa, "Like Krishna Lifting A Hill," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p.191.

February 1974

The first series of final meetings pertaining to the proposed nuclear test are conducted. In this round, discussion centers on "the economic repercussions and possible political fallout of the experiment," according to Raja Ramanna.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.174.

April 1974

A pilot scale fluidized-bed chlorination facility for reprocessing off-grade zircaloy scrap is successfully commissioned. In this facility, various types of zircaloy scrap such as ingot crowns, rejected tubing, plate scrap, end

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plugs, wire, mill turnings etc. are successfully chlorinated at optimum recovery levels.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.128.

April-September 1974

The Zirconium Sponge Plant located at the Nuclear Fuel Complex (NFC) in Hyderabad, suffers from an inadequate power supply and also from a shortage of argon gas during the first quarter.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.128.

April-December 1974

The Nuclear Fuel Complex (NFC) in Hyderabad fabricates and supplies an additional 1,372 fuel bundles to the Unit-1 reactor of the Rajasthan Atomic Power Station (RAPS).

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.8.

April-December 1974

The Nuclear Fuel Complex (NFC) in Hyderabad also fabricates and supplies 80 units of enriched fuel assemblies to the Tarapur Atomic Power Station (TAPS) in addition to the 80 supplied during 1973-74.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.8.

13 May 1974

Components of the nuclear device arrives at the Pokhran test site in the Rajasthan desert. Members of the nuclear team - Soni, Kakodkar, Iyengar, Venkatesan and Balakrishnan -- begin final preparations to assemble the device. Apart from the desert heat, the scientists are worried that the plutonium sphere will overheat the device. Kakodkar uses a specially designed copper disc to surround the plutonium sphere and dissipate the heat generated by its neutron activity.

—Raj Chengappa, "Like Krishna Lifting A Hill," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p. 195.

13 May 1974

The nuclear team encounters extreme weather conditions in the Rajasthan desert, which hampers assembly of the nuclear device. The heat causes metal components of the device to expand preventing a snug fit.

—Raj Chengappa, "Like Krishna Lifting A Hill," *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.196.

14 May 1974

After two days of apprehension the nuclear device is finally assembled by night time.

—Raj Chengappa, "Like Krishna Lifting A Hill," *Weapons of Peace: The Secret of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.196.

15 May 1974

The nuclear device is wheeled out and lowered into the underground test shaft. A small sandstorm in the desert helps cover the actions of the scientists from satellites that may be hovering above.

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—Raj Chengappa, "Like Krishna Lifting A Hill," *Wepaons of Peace: The Secret of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.196.

16 May 1974

The Chairman of the Atomic Energy Commission (AEC) Homi Sethna returns to the test site after securing final clearance from Prime Minister Gandhi to conduct the test

—Raj Chengappa, "Like Krishna Lifting A Hill," *Wepaons of Peace: The Secret of India's Quest to be a Nuclear Power* (New Delhi, India: HarperCollins Publishers India, 2000) p.197.

18 May 1974

India conducts a nuclear test at 8:05AM at Pokhran in the Rajasthan desert. The Indian Government announces the blast (without specifying the location) and declares it as "a peaceful nuclear explosion experiment." The Atomic Energy Commission (AEC) states that India has "no intention of producing nuclear weapons."

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.178.

18 May 1974

Indian Prime Minister Indira Gandhi tells a press conference that "there's nothing to get excited about. This is our normal research and study. But we are firmly committed to only peaceful uses of atomic energy."

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.178.

19 May 1974

Pakistan reacts predictably to the Indian blast. Prime Minister Zulfikar Ali Bhutto declares that the test is a threatening, "fateful development." He also states that Pakistan is "determined not to be intimidated" and would never fall prey to "nuclear blackmail" by India.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.185.

21 May 1974

Ivan Head, chief foreign policy adviser to Canadian Prime Minister Pierre Elliot Trudeau, says that "India's May 18 explosion of nuclear device violates '71 understanding between India and Canada on Canadian aid to India's nuclear energy program." Also, Canadian Minister of Trade and Commerce, Mitchell W. Sharp, announces that Canada is re-examining its nuclear relations with India.

—*The New York Times*, Information Bank Abstracts, 21 May 1974, in Lexis-Nexis Academic Universe, 21 May 1974, <http://web.lexis-nexis.com>.

22 May 1974

Prime Minister Gandhi seeks to allay Pakistani concerns by writing to Pakistani Prime Minister Zulfikar Ali Bhutto. In the letter she states, "We remain fully committed to our traditional policy of developing nuclear energy entirely for peaceful purposes. The recent underground nuclear experiment conducted by our scientists in no way alters this policy....There are no political or foreign policy implications of this test. We remain committed to settle all our

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differences with Pakistan peacefully through bilateral negotiations in accordance with the Simla Agreement."

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.185.

22 May 1974

Canada evinces the strongest international reaction to the nuclear explosion at Pokhran, reflecting a sense of betrayal at India's use of the Canadian-supplied CIRUS reactor as the source of the plutonium used in the peaceful nuclear explosion (PNE). As a result, Canada freezes all assistance to India for the Rajasthan-II Pressurized Heavy Water reactor (PHWR-Unit 2) and the Kota Heavy Water plant, both under construction.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.186.

22 May 1974

India is criticized at the Geneva Disarmament Conference for having exploded a nuclear device on May 18. India's representative Brajesh C. Mishra rejects the suggestion that India is the "6th nuclear power." He also says that "all nations developing uses of nuclear energy are nuclear powers," and that "India has no intention of becoming a nuclear-weapon power."

—*The New York Times*, Information Bank Abstracts, 22 May 1974, in Lexis-Nexis Academic Universe, 22 May 1974, <http://web.lexis-nexis.com>.

24 May 1974

Indian officials reportedly feel that Canada's suspension of its nuclear aid to India, because of the underground nuclear test, will not affect India's nuclear energy program.

—*The New York Times*, Information Bank Abstracts, 24 May 1974, in Lexis-Nexis Academic Universe, 24 May 1974, <http://web.lexis-nexis.com>.

26 May 1974

The Indian Government stung by foreign criticism of its nuclear test, reacts with anger and dismay. Prime Minister Indira Gandhi delivers an African Liberation Day speech, in which she strongly defends the test and assures India's neighbors that there is nothing to fear. The Prime Minister also replies to criticism that "impoverished India cannot afford the luxury of nuclear experiment." She insists that "it is only through acquisition of higher technology that India can overcome its poverty and economic backwardness."

—*The New York Times*, Information Bank Abstracts, 26 May 1974, in Lexis-Nexis Academic Universe, 26 May 1974, <http://web.lexis-nexis.com>.

May 1974

The construction on the R-5 (Dhruva) research reactor commences with the award of excavation contract for the reactor building.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.9.

2 June 1974

The Jana Sangh's (opposition political party) Central Working Committee issues a resolution declaring May 18 was

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"a red letter day in Indian history." The party salutes the Indian scientists who "placed India on the nuclear map of the world."

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.179.

6 June 1974

Pakistani Prime Minister Bhutto responds to Indira Gandhi (in a letter), in which he denies any distinction between a peaceful and a military nuclear detonation and declares India's new military capability "a permanent factor to be reckoned with." Pakistan calls on the nuclear weapons states (NWS) to provide non-nuclear weapons states (NNWS) with protection against nuclear threats and then cancels talks with India on normalization of relations, which had been scheduled for June 10.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) pp.185-186.

June 1974

Despite the May 18th nuclear test, the United States proceeds to ship an installment of previously approved uranium fuel for India's Tarapur reactor. The US administration concludes that the Indian test did not violate any agreement with the United States and that Washington is mandated by the 1963 nuclear cooperation agreement and related 1966 contract, to sell enriched uranium to India for the Tarapur reactor.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.184.

4 July-12 October 1974

The Unit-1 reactor of the Rajasthan Atomic Power Station (RAPS) is shut down due to failure of some of the blades of the HP rotor of the turbine, and for annual maintenance.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.123.

22 July 1974

Prime Minister Indira Gandhi makes a statement in the Lok Sabha (lower house of parliament) concerning China's reaction to the peaceful nuclear explosion (PNE). She says, "China responded to the Indian PNE with conscious aloofness, reporting the event without comment."

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.187.

July 1974

Dr. Raja Ramanna, lead scientist of the Pokharan explosion, says that the Fast Breeder Test Reactor (FTBR) at the Reactor Research Centre in Kalpakkam, Tamil Nadu is "coming out of the ground," and that it "should be operating by 1977-78," and that by the early 1980's they (Department of Atomic Energy) would be able to design a breeder reactor for commercial operation. More specifically, the department will have obtained considerable experience on such systems to be able to design a power breeder reactor to come up in the late 1980's.

—Dhirendra Sharma, *India's Nuclear Estate* (New Delhi, India: Lancers Publishers, 1983) pp. 99,159.

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July 1974

The Unit-2 Boiling Water Reactor (BWR) at the Tarapur Atomic Power Station (TAPS) is shut down for refueling.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.7.

July 1974

The site layout for the Narora Atomic Power Station (NAPS) is finalized by the Department of Atomic Energy (DAE).

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.126.

8 August 1974

The Lok Sabha (lower house of parliament) debates the nuclear test.

—Raj Chengappa, "The Wages of Armageddon," *Weapons of Peace: The Secret of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000) p.205.

29 August 1974

India's deputy defense minister tells Parliament that India is watching China's nuclear development but that the Indian government does not fear a Chinese nuclear threat.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.187.

16-21 September 1974

Dr. H.N. Sethna, Chairman, Atomic Energy Commission (AEC) and Secretary, Department of Atomic Energy (DAE), leads an Indian delegation to participate in the 18th regular session of the IAEA General Conference in Vienna, Austria.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.14.

September 1974

The US and Indian Atomic Energy Commissions (AEC's) engage in a brief negotiations over safeguards and other assurances that would be required before additional fuel can be sent to India for the Tarapur nuclear reactors.

—George Perkovich, "India Explodes A 'Peaceful' Nuclear Device," *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: The University of California Press, 1999) p.184.

September 1974

The Unit-1 Boiling Water Reactor (BWR) of the Tarapur Atomic Power Station (TAPS) suffers a severe set-back due to the total loss of power caused by an operator-error in the switchyard, which is managed by the Maharashtra State Electricity Board (MSEB). This error causes extensive flooding damage in the Unit drywell and also causes suffering to the Unit-2 reactor.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.122.

October 1974

The Atomic Power Authority (APA) takes over control of the switchyard from the Maharashtra State Electricity Board (MSEB).

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.122.

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1 December 1974

As of this date, the total strength of the Bhabha Atomic Research Centre (BARC) is 10,531. This total number comprises of 2,716 scientific, 4,663 technical, 1,240 administrative and 1,912 general maintenance and auxiliary staff.

—Department of Atomic Energy, Government of India, "Annual Report: 1974-1975," p.109.

22 December 1974

Prime Minister Indira Gandhi visits the nuclear test site at Pokharan. She takes a quick ride around the crater and stops for photo opportunities.

—Raj Chengappa, "The Wages of Armageddon," *Weapons of Peace: The Secret of India's Quest to be a Nuclear Power* (New Delhi: HarperCollins Publishers India, 2000) p. 210.

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1973-1972**1973**

According to Raja Ramanna, architect of the nuclear project, "all the necessary technical problems have been solved (by 1973)." A site is found in the Indian army's test range in the Rajasthan desert, in the north-west of India, a 'closed area with a sparse human population.'

—Itty Abraham, *The Making of the Indian Atomic Bomb: Science, Secrecy and the Postcolonial State* (London, UK & New York, NY: Zed Books Ltd, 1998) p. 142.

January 1973

Raja Ramanna, director of the Bhabha Atomic Research Centre (BARC) and coordinator of the nuclear project, orders the shutdown of the Purnima-1 reactor in order to makeup for the shortage of plutonium required for the nuclear test. Ramanna's team follows up by melting the Purnima-1 reactor's plutonium oxide fuel rods in order to get enough pure plutonium for the test.

—Raj Chengappa, *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p. 185.

March 1973

The Defence Research and Development Organisation (DRDO) reportedly tests the non-nuclear explosives system in the forests of Andhra Pradesh. The system is detonated using chemical explosives.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 172; Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad, UP India: Vikas Publishing House PVT LTD, 1979) p. 144.

April 1973

Chairman of the Atomic Energy Commission (AEC) Homi Sethna estimates that India will have a total installed capacity of 43 million MW of nuclear power by the end of the century.

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—K.K. Pathak, *Nuclear Policy of India - A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248.

June 1973

A secondary control valve vibration is noticed in the boiling water reactor (BWR) unit-1 of the Tarapur Atomic Power Station (TAPS). The oil piping and operating linkages are observed to be heavily vibrating and the vibrations are severe near the servo system. The long push pull rods on the control system, originally made of aluminum pipes, are found to be subject to stretch and deformation. These aluminum push pull rods are replaced by heavy carbon steel pipes. Furthermore, while testing the bypass system for operability during load rejections on Unit-1, the bypass system does not operate; it is discovered that the control system linkage has snapped.

—Dhirendra Sharma, *India's Nuclear Estate "Problems Associated with Nuclear Turbines at Tarapur,"* (Report submitted by K.P. Rao and K. Nanjundeswaran, two senior engineers at TAPS (in 1975), TAPS/Report/1059) (New Delhi, India: Lancers Publishers, 1983) p. 67.

11 July 1973

The operating oil supply line to the secondary control valve servo motor on the boiling water reactor (BWR) unit-2 at the Tarapur Atomic Power Station (TAPS) fails due to the severing of a socket weld elbow joint on a horizontal run.

—Dhirendra Sharma, *India's Nuclear Estate "Problems Associated with Nuclear Turbines at Tarapur,"* (Report submitted by K.P. Rao and K. Nanjundeswaran, two senior engineers at TAPS (in 1975), TAPS/Report/1059) (New Delhi, India: Lancers Publishers, 1983) p. 68.

31 July 1973

Boiling water reactor (BWR) unit-2 of the Tarapur Atomic Power Station (TAPS) is operating at 159MW when there are sudden disturbances in the hydraulic oil lines as a result of the cycling of the turbine stop valves. Temporary repair is carried out as the unit is put on the system grid.

—Dhirendra Sharma, *India's Nuclear Estate "Problems Associated with Nuclear Turbines at Tarapur,"* (Report submitted by K.P. Rao and K. Nanjundeswaran, two senior engineers at TAPS (in 1975), TAPS/Report/1059) (New Delhi, India: Lancers Publishers, 1983) p. 68.

September 1973

Physical preparations for the peaceful nuclear explosion begin at the Rajasthan test site. The preparation work is carried out by the Indian army.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 172.

15 November 1973

Prime Minister Indira Gandhi is asked in writing during a parliamentary debate in the Rajya Sabha (upper house) "whether any final decision has been taken to conduct experiments to develop nuclear blast technology for utilization for peaceful purposes; and... if not, whether any time schedule has been set for the purpose."

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 173.

15 November 1973

Gandhi responds to this question by denying that a final decision has been made and a schedule set for an explosion. Furthermore, she adds that "it is only after satisfactory answers to all these problems are available [theoretical and experimental questions; economic questions; environmental and ecological effects] that the question of actual underground tests for peaceful purpose can be undertaken."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 173.

1972

Prime Minister Indira Gandhi approves the nuclear explosive device experiment; work intensifies on all elements of the experiment: the electrical system within the device, the neutron initiator, the shape charges to implode the plutonium, the diagnostic equipment and instruments, etc. The experiment is supervised by a team of scientists including Raja Ramanna--the director of the Bhabha Atomic Research Centre (BARC), Dr. B.D. Nag Chaudhri--scientific advisor to the minister of defense and director of the Defence Research and Development Organisation (DRDOO), P.K. Iyengar, and R. Chidambaram.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 172.

22 January 1972

H.N. Sethna, Director of the Bhabha Atomic Research Centre (BARC) takes over as Secretary of the Department of Atomic Energy (DAE), in addition to his responsibility with BARC.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972.," p. 3.

February 1972

H.N. Sethna takes over as chairman of the Atomic Energy Commission (AEC). He succeeds Vikram Sarabhai who died on December 31, 1971.

—Raj Chengappa, *Weapons of Peace-The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p. 154.

Spring 1972

Concentrated work on building the vital components for a nuclear explosive device begins.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p.172.

17 March 1972

Debates concerning nuclear policy resurface in the Indian parliament. In the Lok Sabha (lower house of parliament), the government is asked in writing whether the war with Pakistan "brought out the necessity for India to have more modern weapons" and, if so, "whether Government proposes to embark upon the manufacture of nuclear bombs."

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p.169.

17 March 1972

Indian Defense Minister Jagjivan Ram, responds to the Lok Sabha's questioning by stating that "army modernization was an ongoing process and that the Government's policy with regard to production of nuclear weapons...is to use nuclear energy for peaceful purposes only." The government believes that the defense of the borders can be best ensured by adequate military preparedness based on conventional weapons. Moreover, the possession of nuclear weapons is no substitute for such military preparedness.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p.169.

April 1972

The Atomic Energy Commission's (AEC's) Heavy Water Board (HWB) decides to build the country's fifth heavy water plant at Talcher, Orissa. The plant will be constructed by the West German company-UHDE GmbH.

—K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p.248; *India Profile: Nuclear Facilities-Talcher Heavy Water Plant*. (NTI website-India Nuclear Profile. www.nti.org).

3 May 1972

During a debate concerning military affairs in parliament, Indian Defense Minister Jagjivan Ram states that "India is studying technology for carrying out underground nuclear explosions for peaceful purposes;" and adds that "India is still opposed to making nuclear weapons, though she is keeping her options open."

—*The New York Times*, Informational Bank Abstracts, 3 May 1972, in Lexis-Nexis Academic Universe, 3 May 1972, web.lexis-nexis.com.

22 May 1972

The Purnima-I research reactor is commissioned at the Bhabha Atomic Research Center (BARC) in Trombay. Purnima is a zero energy fast reactor. It is designed, fabricated, and commissioned entirely by scientists and engineers of BARC. It is fueled by 21.8 kgs of plutonium. This reactor is different from existing reactors and holds the promise of fast breeder reactors. Its operation signifies a valuable achievement in the development of reactor technology in India.

—Raj Chengappa, *Weapons of Peace: The Secret Story of India's Quest to be a Nuclear Power* (New Delhi, India: Harper Collins Publishers India, 2000) p.125; K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p.46.

May 1972

Pressure continues to build within parliament for a more robust nuclear posture than Jagjivan Ram offered in March. During two days of debate over the Ministry of Defence's budget, speakers from the majority of political parties call for developing nuclear weapons, or at least greater preparation of relevant elements of nuclear explosives.

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 169.

23 July 1972

The United Nations Association of the United States issues a report by a panel of Americans on the problem of preventing the spread of nuclear weapons. The report says that "India has enough plutonium not subject to safeguards against weapons production to make as many as 19 atomic bombs."

—*The New York Times*, Information Bank Abstracts, 23 July 1972, in Lexis-Nexis Academic Universe, 23 July 1972, web.lexis-nexis.com.

11 August 1972

The first pressurized heavy water reactor (PHWR-Unit 1) of the Rajasthan Atomic Power Station (RAPS) attains criticality. This reactor was built with Canadian assistance.

—K.K Pathak, *Nuclear Policy of India: A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p.248; *The New York Times*, Information Bank Abstracts, 12 August 1972, in Lexis-Nexis Academic Universe, 12 August 1972, web.lexis-nexis.com; *India Profile: Nuclear Facilities-Rajasthan Atomic Power Station (RAPS)* (NTI website-India Nuclear Profile. www.nti.org.)

7 September 1972

Prime Minister Indira Gandhi authorizes the fabrication of a device for a peaceful nuclear explosion. It is also the day of the tenth convocation of the Indian Institute of Technology, Powai (Bombay).

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 171-172.

November 1972

The Indian parliament expresses interest in developing India's nuclear strength once again. A pointed query is made in the Lok Sabha (lower house of parliament) regarding "progress...in feasibility study and other preparations for the experimental nuclear explosion for peaceful purposes."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 170.

15 November 1972

Prime Minister Indira Gandhi responds, in writing, to the pointed query made in the Lok Sabha (lower house of parliament). She states that "the Atomic Energy Commission is constantly reviewing the progress in the technology of underground nuclear explosions both from the theoretical and experimental angles and also taking into account their potential economic benefits and possible environmental hazards."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 170.

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1971-1970

18 January-3 February 1971

A high-level Japanese delegation representing a cross section of Japan's nuclear industry visits various facilities of the Department of Atomic Energy (DAE) in India and acquaints itself with the progress achieved by India in the field of atomic energy.

—Department of Atomic Energy, Government of India, "Annual Report: 1970-1971," p. 123.

27 January 1971

India, the United States, and the International Atomic Energy Commission (IAEA) sign a trilateral agreement. The agreement signifies the transfer of "the responsibility for the implementation of safeguards in respect of the Tarapur Atomic Power Station," from the United States Atomic Energy Commission to the IAEA.

—Department of Atomic Energy, Government of India, "Annual Report: 1970-1971," p. 123.

15-19 March 1971

An Indo-German seminar on fuel cycles is held in Trombay. The Seminar provides an opportunity "to establish personal contacts between scientists engaged in the fuel program in the department and their counterparts in the Federal Republic of Germany."

—Department of Atomic Energy, Government of India, "Annual Report: 1970-1971," p. 123.

March 1971

The Director in-Charge of Science and Technology, League of Arab States, Salah El-Din Hedayat, visits India. He tours facilities of the Department of Atomic Energy (DAE) and holds discussions on "matters of mutual interest to India and the Arab states in the field of peaceful uses of atomic energy."

—Department of Atomic Energy, Government of India, "Annual Report: 1970-1971," p. 123.

April 1971

The Department of Atomic Energy's Heavy Water Board signs a supply contract with the French-Swiss consortium-GELPRA to construct the Tuticorin Heavy Water Plant in the state of Tamil Nadu.

—K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248; *India Profile: Nuclear Facilities-Heavy Water Plants*. (NTI website-India Nuclear Profile. www.nti.org).

May 1971

Construction begins on the Tuticorin Heavy Water Plant.

—K.K. Pathak, *Nuclear Policy of India- A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248.

May 1971

The Zirconium Oxide Plant located at the Hyderabad Nuclear Fuel Complex (NFC) begins operations to produce nuclear-grade zirconium oxide.

—K.K. Pathak, *Nuclear Policy of India- A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248; Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 37.

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May 1971

The Government of India sanctions the second unit at the Madras Atomic Power Station (MAPS).

—K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p. 248.

6 June 1971

During her visit to Mauritius, Prime Minister Indira Gandhi attempts to make a distinction between peaceful nuclear explosives and a full-fledged weapons program. She says, "We have discussed this question deeply and rejected the idea of making a bomb. Once we launch into making it, we would have to incur heavy expenses to keep abreast of nuclear weaponry and at the same time maintain conventional equipment."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 159.

June 1971

The production of zirconium sponge from the Zirconium Oxide Plant at the Nuclear Fuel Complex (NFC) commences with an output of 70 kg/batch.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," pp. 4-5, 37.

30 August 1971

The Government of India and the Socialist Republic of Rumania (Romania) sign an agreement, which calls for "cooperation in the utilization of atomic energy for peaceful purposes" in Bucharest.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p.150.

August 1971

The scheduled refueling of one of the Boiling Water Reactors (BWR) (2) at the Tarapur Atomic Power Station occurs. This is the first time that one of the two reactors has been shut down since the start of operations in 1969.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 21.

6-16 September 1971

Atomic Energy Commission (AEC) Chairman Vikram Sarabhai leads an Indian delegation of 15 Bhabha Atomic Research Center (BARC) scientists at the 4th UN International Conference on Peaceful Uses of Atomic Energy in Geneva.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," pp. 146, 150.

30 September 1971

The International Atomic Energy Agency (IAEA), the Government of Canada, and the Government of India sign an agreement in Vienna, which relates to "safeguards provisions in respect to the Rajasthan Atomic Power Station and the Douglas Point Nuclear Generating Station (in Canada)." This agreement symbolizes the transfer of "the responsibility for the implementation of safeguards in respect to the two atomic power stations" to the IAEA.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," pp. 150-151.

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September 1971

Atomic Energy Commission (AEC) Chairman Vikram Sarabhai addresses an audience at the Fourth International Conference on the Public Uses of Atomic Energy in Geneva. Sarabhai tells the audience that Indian scientists are developing nuclear explosive engineering (i.e., peaceful nuclear explosives) as a top priority. A peaceful nuclear explosive rather than a full-fledged bomb program is much more likely for India.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 159.

September 1971

The main Zirconium Sponge Plant located at the Nuclear Fuel Complex (NFC) in Hyderabad goes into operation and sponge is being produced in the plant at the rated capacity of about 200 kg/batch. The sponge is of high quality, meeting nuclear grade specification.

—K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980) p.248; Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 37.

1 October 1971

Canadian Prime Minister Pierre Trudeau, prompted by Sarabhai's statement concerning peaceful nuclear explosives and goaded by an alarmed U.S. bureaucracy, writes to Indira Gandhi, to declare that "use of Canadian supplied material, equipment and facilities... for the development of a nuclear device would inevitably call on our part for a reassessment of our nuclear cooperation agreement with India."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999) p. 159.

5 October 1971

The Government of India and the Federal Republic of Germany sign an agreement that calls for "cooperation in the peaceful uses of atomic energy and space research" in New Delhi.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 150.

23 October-5 November 1971

V.N. Meckoni, head of the Reactor Engineering Division at the Bhabha Atomic Research Center BARC, leads a team of scientist and engineers on a visit to Japan in response to an invitation from the Power Reactor and Nuclear Fuels Development Corporation of Japan.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 151.

October 1971

The Uranium Oxide Plant located at the Nuclear Fuel Complex (NFC) begins to perform trial runs, starting with the uranium concentrates from the Uranium Corporation of India Ltd. at Jaduguda. The various sections of the plant have been successfully commissioned in stages.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," pp. 5, 38.

October 1971

The bilateral agreement "on the peaceful uses of atomic energy," between the Indian Atomic Energy Commission

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and the National Atomic Energy Commission of the Hungarian People's Republic is further extended/renewed for a period of five years to October 1976.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 151.

15 December 1971

The main transformer of the Boiling Water Reactor (BWR) Unit-1 develops an internal fault during the re-energizing process and damages the windings of the transformer. Indian experts and the American manufacturer (General Electric) jointly examine the transformer in great detail. The replacement parts needed for repairs are expected to arrive by May 1972.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 24.

31 December 1971

The total strength of the workforce at the Bhabha Atomic Research Centre (BARC) in Trombay reaches 9,624 staff members consisting of 2,134 scientific, 4,028 technical, 1,774 administrative, and 1,729 general maintenance and auxiliary staff.

—Department of Atomic Energy, Government of India, "Annual Report: 1971-1972," p. 17.

19 January 1970

Prime Minister Indira Gandhi dedicates the 380MWe Tarapur Atomic Power Station to the country. The Tarapur plant is India's first nuclear power station.

—Department of Atomic Energy of India, Government of India. "Annual Report:1969-1970," pp. iii.

6 March 1970

The Nuclear Non-Proliferation Treaty (NPT) becomes effective as a result of ratification by the United States, Soviet Union, Great Britain, and 44 other nations.

—*The New York Times*, Informational Bank Abstracts, 6 March 1970, in Lexis-Nexus Academic Universe, 6 March 1970, <http://web.lexis-nexus.com>.

31 March 1970

India's Consultative Committee on Foreign Affairs and Atomic Energy persuades the government to study, or restudy the costs of developing nuclear weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 150.

April 1970

India's Atomic Energy Commission (AEC) Chairman Vikram Sarabhai appoints N. Seshagiri of the Tata Institute of Fundamental Research (TIFR) to conduct a cost-benefit analysis of a nuclear weapons program.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 150.

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April 1970

China launches a long-range rocket carrying a satellite into orbit. This feat "alarms Indian officials and intensifies the national debate on nuclear policy."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 151.

9-10 May 1970

The Indian Parliamentary and Scientific Committee organizes a meeting of "eminent scientists, academics and politicians in New Delhi," and strongly urges the government to "revise its policy and produce nuclear weapons immediately."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp.151-152.

14 May 1970

During a visit to the Stockholm International Peace Research Institute (SIPRI), N. Vellodi, secretary of the Atomic Energy Commission, questions analysts about "the utility of tactical nuclear weapons." Vellodi tells SIPRI officials that India "was conducting an internal review of the option to produce nuclear warheads," and was considering tactical nuclear weapons as a viable option. SIPRI officials express skepticism about the use of such weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 150.

17 May 1970

Atomic Energy Commission (AEC) Chairman Vikram Sarabhai declares that "India would not seek nuclear weapons but that it would retain the option for conducting underground nuclear explosions for peaceful purposes."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 152.

25 May 1970

Sarabhai announces the "Sarabhai Profile, a 10-year plan for the development of atomic energy and space research in India."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 152.

June 1970

The Apsara research reactor (1MW) goes into operation at the Bhabha Atomic Research Center (BARC).

—Department of Atomic Energy, Government of India. "Annual Report: 1970-1971," p. 92.

July 1970

Vikram Sarabhai asserts that "India is capable of conducting underground nuclear explosives and is internationally entitled to do so as a nonparty to the NPT."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 155.

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August 1970

The Indian Institute of Public Opinion conducts a poll that confirms the argument that the Indian public is increasingly supportive the government's push for acquiring nuclear weapons. "Over 69 percent of all those polled in the four metropolitan areas (New Delhi, Bombay, Calcutta and Madras) are pro-Bomb; more than 53 percent said they were for acquiring nuclear weapons, even if this resulted in tax increases."

—Bharat Karnad, *Nuclear Weapons & Indian Security* (New Delhi, India: Macmillan India Limited, 2002), p. 296.

August 1970

Canada begins work on the Kota Heavy Water Plant in Bombay.

—K.K. Pathak, *Nuclear Policy of India-A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980), p. 248.

28 August, 1970

Indian Prime Minister Indira Gandhi says that India is weighing the use of nuclear explosions for peaceful purposes but has no plans to develop weapons.

—*The New York Times*, Information Bank Abstracts, 28 August 1970, In Lexis-Nexis Academic Universe, 28 August 1970, <http://web.lexis-nexis.com>

31 August, 1970

Prime Minister Indira Gandhi informs Parliament that the government is studying the economic and technical issues surrounding peaceful nuclear explosives.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 155.

September 1970

India's Department of Atomic Energy (DAE) appoints a Site Selection Committee to examine suitable sites in the "Northern, Western and Southern Electricity Regions for new atomic power stations."

—Department of Atomic Energy of India, Government of India. "Annual Report: 1970-1971." p. 28.

September 1970

The Bhabha Atomic Research Center (BARC) in Trombay successfully separates uranium-233 from thorium.

—K.K. Pathak, *Nuclear Policy of India- A Third World Perspective* (New Delhi, India: Gitanjali Prakashan, 1980), p. 248.

16 November 1970

India's renewed debate and official statements showing interests in peaceful nuclear explosions alarms US government officials. As a result, the United States presents an "aide-memoire" to the Indian government declaring that Washington would regard an Indian nuclear explosion using plutonium derived from the CIRUS reactor, which is moderated by a U.S.-supplied heavy water, as a violation of the U.S.-India nuclear cooperation agreement. India rejects the U.S. interpretation and states that it has a right to pursue "any peaceful applications of nuclear energy, including peaceful nuclear explosives."

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley & Los Angeles, CA: University of California Press, 1999) p. 159.

December 1970

Prime Minister Gandhi sanctions the Indian Navy's Project 937 to build a nuclear submarine, also called the Advanced Technology Vehicle (ATV).

—Bharat Karnard, *Nuclear Weapons & Indian Security* (New Delhi, India: Macmillan India Limited, 2002), p. 303;
Raj Chengappa, *Weapons of Peace* (New Delhi, India: Harper Collins Publishers India, 2000), pp. 129-130.

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1969-1965

1 February 1969

Reactor No. 1 of TAPS goes critical.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 80.

1 April 1969

Reactor No. 2 of TAPS goes critical.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 80.

1969

AEC leaders decide to build the Purina reactor after Dr. Iyengar visits a fast breeder reactor at Dubna in the Soviet Union. This project goes forward without official approval because it has virtually no budget and is instead made up of materials gathered from various divisions at Bhabha Atomic Research Centre (BARC).

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 150.

1969

The plutonium reprocessing plant at Trombay is operated throughout the year for processing plutonium as well as collecting "plant scale data" for the Power Reactor Fuel Reprocessing Plant (PRFRP) at Tarapur. The construction of the PRFRP main building plant is nearly 40 percent complete.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," pp. 15-16.

1969

The Fuel Element Fabrication Facility at Trombay completes 10 years of operations. The facility manufactures "metallic fuel elements, components, and sub-assemblies," as well as fabrication of "half the initial fuel charge for the RAPP-1" reactor.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 20.

1969

ECIL sets up building for manufacturing power reactor instruments, resistors, capacitors, servo controls and allied

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instruments.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 77.

1969

The DAE specifies that the Nuclear Fuels Complex (NFC) under construction in Hyderabad will comprise the following:

a uranium oxide plant with an initial capacity to produce 125 tons of ceramic- and nuclear-grade uranium oxide from the Jaduguda uranium mines.

a zirconium plant with an initial capacity to produce 50 tons of finished zircaloy components, required for the fuel element sheathing and the reactor core. The plant will consist of three constituent plants: zirconium oxide plant, zirconium sponge plant, and zircaloy fabrication plant.

a ceramic fuel fabrication plant to produce 100 tons of finished fuel elements annually for the CANDU-type reactors.

an enriched uranium oxide plant with a capacity to produce 25 tons of ceramic grade enriched uranium oxide powder from imported enriched uranium hexa-fluoride.

an enriched uranium fuel fabrication plant with a capacity to produce 20 tons of zircaloy clad enriched uranium oxide fuel elements for TAPS.

a special materials plant to produce a variety of high purity materials and metals for the electronics industry.

ancillary facilities to serve the above plants.

The uranium oxide plant, the zirconium oxide plant, the zirconium sponge plant, and the ceramic fuel fabrication plant are scheduled to be completed by the end of 1970; the special materials plant is expected to become operational by mid-1971; and the zircaloy fabrication plant is expected to be commissioned in stages stretching until 1972. The total capital outlay for the complex is estimated at 138.4 million rupees.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," pp. 78-79.

1969

DAE begins work on a 100 tons/year heavy water plant alongside the RAPS-1 plant in Rajasthan. Another plant, based on the ammonia-hydrogen exchange process, with an annual capacity of 67.2 tons is being set up with the help of a French consortium at Baroda. The latter plant is expected to be commissioned in 1973-74.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 80.

1969

Construction of the main plant building of Unit 1 of RAPS complete. Construction of the RAPS-2 unit makes progress.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 81.

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1969

DAE acquires land for the construction of the Madras Atomic Power Station (MAPS) and begins construction of the reactor and turbine buildings for the first unit.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 81.

1969

The AEC approves preparation of a detailed project report for the fast breeder reactor in collaboration with the French Commissariat A L'Energie Atomique. As part of the agreement, a team of 30 Indian nuclear scientists, engineers, and technicians travels to France for work on the "detailed designs of the prototype reactor," which is expected to be completed within the next 12-18 months. The report is expected to be submitted by June 1970.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 84.

1969

DAE plans to establish a Reactor Research Center at the site of MAPS near Kalpakkam. The Center will have the following facilities:

heat transfer and liquid metal technology laboratories

materials research laboratories

fuel reprocessing and fuel fabrication facilities

zero energy fast reactor facility

a small fast breeder test reactor incorporating the maximum parameters of a large prototype power reactor

The laboratories are expected to be commissioned by the end of 1970.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," pp. 83-84.

Late 1967 or Early 1968

Dr. Raja Ramanna, leader of the physics group at the Bhabha Atomic Research Centre (BARC), "quietly" asks Rajagopala Chidambaram to "derive the equation of state for plutonium" in order to start work on the development of a nuclear weapon using plutonium. This equation is intended to inform scientists of the amount of high explosives necessary to compress plutonium by describing the compression and the resulting expansion of the plutonium core and the release of fission energy as a function of time. This equation is also vital to determining the proper timing for triggering the neutron initiator for attaining the greatest possible explosive yield.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 125, 140-41, 509.

1968

The process of designing the nuclear explosive device to be used in the Pokhran test explosion is initiated.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 141.

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Early 1968

Chidambaram begins recruiting scientists at BARC and in the laboratories of the Defence Research and Development Organisation (DRDO) to design parts for the chemical high-explosive mechanism required to implode the core of a nuclear device.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 141.

24 April 1968

Prime Minister Gandhi makes a speech outlining India's case against the development of nuclear weapons. She states that "nuclear weapons are no substitute for military preparedness, involving conventional weapons. The choice before us involves not only the question of making a few atom bombs, but of engaging in an arms race with sophisticated nuclear warheads and an effective missile delivery system." This, she says, would not enhance national security, but put internal security in jeopardy due to the economic burden it would entail.

—Statement by Prime Minister Indira Gandhi, Lok Sabha, 24 April 1968 in J.P. Jain *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), pp. 201-202.

May 1968

The DAE commissions a uranium mine at Jaduguda (Bihar state).

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 77.

12 June 1968

The Indian Parliament vetoes Indian signature of the recently completed Nuclear Non-Proliferation Treaty (NPT).

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 125.

November 1968

DAE commissions a uranium mill at Jaduguda (Bihar state) to process uranium ore.

—Department of Atomic Energy of India, Government of India, "Annual Report: 1969-1970," p. 77.

12 January 1967

Prime Minister Indira Gandhi renames the Atomic Energy Establishment at Trombay the "Bhabha Atomic Research Center" in honor of the late Dr. Bhabha.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 131.

January 1967

Dr. Sarabhai tells the US Atomic Energy Commission Chairman Seaborg that India does not have a program to develop peaceful nuclear explosions (PNEs) "in progress or contemplated."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 134.

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21 February 1967

US President Lyndon Johnson sends a message to the Eighteen Nation Disarmament Commission (ENDC) in which he expresses the necessity of nuclear nonproliferation and equates peaceful nuclear explosions (PNEs) with nuclear weapons. As a caveat to those states wishing to utilize PNEs for development projects, he states that the United States will be ready to provide PNE services to other nations, under the proper controls and at a reasonable cost.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 134.

March 1967

The DAE proposes a fast breeder reactor program to be located at a new site at Kalpakkam. According to the plans, construction on an experimental fast breeder reactor would begin in July 1971 with French assistance. In addition, plans provided for a "zero-energy fast reactor" and a "pulsed fast reactor" to be built at the same site.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 149.

1 March 1967

A number of "prominent Indian citizens" address a joint statement to the Indian government against signing the Nuclear Non-Proliferation Treaty (NPT) as it is put forth by the United States and the Soviet Union. The signatories claim that India has already compromised its sovereignty by allowing foreign inspections of Indian nuclear facilities, and that this treaty would increase the constraints on India's options without increasing its security.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), pp. 135-36.

27 March 1967

India's lower house of parliament (Lok Sabha) convenes a debate on nuclear policy. Minister of External Affairs Chagla expresses the view that India should not sign the Nuclear Non-Proliferation Treaty (NPT) as it stands because, in addition to failing to provide security for nonaligned states such as India, it would impede future development of peaceful uses of nuclear energy. The Secretaries Committee expresses its hope that the treaty would be improved and that the issue of protection of non-nuclear states would be clarified.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 135-136.

14 April 1967

Dr. Sarabhai and the Indian Ambassador to the United States, B.K. Nehru, propose to the US Atomic Energy Commission Chairman that a joint security guarantee from the United States and the Soviet Union to not attack non-nuclear countries could serve as a suitable alternative to a nuclear nonproliferation treaty.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 136.

18 April 1967

In a meeting with the US Secretary of Defense Robert McNamara, Indian emissary L.K. Jha cites two reasons India is reluctant to sign the Nuclear Non-Proliferation Treaty (NPT). First, India is concerned about its security in regard

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to China, and second India is apprehensive about the potential curtailment of its development of nuclear technology. Dr. Sarabhai adds that while the NPT is "not salable" at present, he hopes that "Indian recalcitrance would not be seen as hiding a secret desire to build a bomb."

—US Defense Department, memorandum of conversation, "Meeting between the Secretary of Defense and Mr. L.K. Jha, Tuesday, 18 April at 10 a.m.," p. 2 in FOIA files, India, National Security Archive, Washington, DC.

Late April 1967

Shortly after Mr. Chagla's return from a trip to Geneva, leaders from India's lower house of parliament (Lok Sabha) hold a news conference demanding that India refuse to sign the Nuclear Non-Proliferation Treaty (NPT) unless all nuclear powers sign and promise not to produce or test any nuclear devices.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 144.

Late April 1967

The Emergency Committee of the Indian cabinet sends an emissary to Moscow, Paris, Washington and London to express India's concern for greater security assurances under the Nuclear Non-Proliferation Treaty (NPT). Prior to the emissary's departure, India receives nearly identical working drafts of the treaty text from Moscow and Washington, intended to underlie the similar positions of the superpowers who are largely unwilling to grant effective security guarantees.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 136.

23 May 1967

Mr. Trivedi addresses the Eighteen Nation Disarmament Commission (ENDC) on the issue of peaceful nuclear explosions (PNEs). He insinuates that the Nuclear Non-Proliferation Treaty (NPT) contains an inherent nuclear weapons apartheid that would inhibit economic and peaceful development in nations such as India. He acknowledges "that the technology involved in the production of a nuclear weapon is the same as the technology which produces a peaceful nuclear explosive device;" however, he stresses that the intent is more important than the technology and that India's intentions are peaceful. His speech concedes that PNEs must be safeguarded, but that these safeguards should apply equally to all nations.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 136.

June 1967

China tests its first thermonuclear explosive device.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 142.

6 October 1967

India's Defense Minister Swaran Singh announces before the UN General Assembly that India will not sign the Nuclear Non-Proliferation Treaty (NPT) because, "while the Government of India continues to be in favor of the non-proliferation of nuclear weapons, it is equally strongly in favor of the proliferation of nuclear technology for

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peaceful purposes, as an essential means by which the developing countries can benefit from the best advances of science and technology in this field."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 149.

10 January 1966

Prime Minister Shastri dies suddenly.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 112.

24 January 1966

Indira Gandhi succeeds Shastri as prime minister. Dr. Bhabha dies in a plane crash on Mont Blanc while in transit to a meeting of the Scientific Advisory Committee of the International Atomic Energy Agency in Vienna. Prime Minister Gandhi selects Vikram Sarabhai as his replacement.

—B.V. Sreekantan, Virendra Singh, and B.M. Udgaoankar, eds. *Homi Jehangir Bhabha: Collected Scientific Papers* (Bombay: Tata Institute of Fundamental Research, 1985), p. 985.

15 February 1966

The Indian representative to the nonproliferation treaty negotiations in Geneva insists on balanced obligations between nuclear weapons states and non-nuclear weapons states. This speech underlines the Indian shift from seeking nuclear guarantees to the desire for the elimination of nuclear weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 115.

1 March 1966

Members from India's lower house of parliament (Lok Sabha) ask Prime Minister Gandhi if the government intends to seek security guarantees from nuclear weapons states instead of developing nuclear weapons indigenously. She states that India will not seek security assurances because India should not "do anything which will precipitate the crisis and lead to the development of nuclear weapons in many more countries."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 115.

9 May 1966

China conducts its third nuclear weapon test. Beijing claims that the device contains "thermo-nuclear material." Indian spokesmen denounce the test, saying that China has given "new radioactive evidence of its hostility to peace and disarmament."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 44.

10 May 1966

A heated debate takes place in the Indian parliament, with many members of parliament calling for a change in government policy. Prime Minister Gandhi intervenes to calm delegates by saying that the government is "building up its atomic power" and "increasing our know-how and other competence," while maintaining its adherence to its policy of peaceful uses of nuclear energy. The Minister of External Affairs announces that the Indian government

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knew that China would conduct more tests and that, while this new test should not change India's policy, the policy is under constant review.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), pp. 45-46.

13 May 1966

The US AEC announces that the Chinese did not test a thermonuclear device, but announces that the test used Lithium-6, a thermonuclear material.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 44.

1 June 1966

Vikram Sarabhai holds his first press conference as chairman of the AEC and secretary of the DAE. He announces his support for the prime minister's continuing non-nuclear weapon stance because "an atomic bomb explosion is not going to help our security." He states that for a credible nuclear deterrent, one prototype is not enough. He claims that India does not have the money to devote to the long-range missiles, radar, electronics, or industrial base that would be required to support a nuclear deterrent.

—Virkram Sarabhai, press conference, June 1, 1966, in J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), p. 179

June 1966

Sarabhai orders confiscation of papers and the end to the peaceful nuclear explosion project currently underway at the AEC.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 122.

Summer 1966

Nuclear weapons opponents in the Lok Sabha rally in support of the government's non-weapons policy. Two hundred thirty-five members of parliament, representing all parties except the Jana Sangh party, sign a memorandum in support of restricting nuclear technology to peaceful uses.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 49.

October 1966

China announces that it has completed a test of a missile carrying a nuclear warhead.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 126.

31 October 1966

Mr. Trivedi addresses the UN First Committee stating that, although India and its fellow countries in the developing world were "nowhere near the nuclear fusion stage" and, therefore, could not yet utilize peaceful nuclear explosions (PNEs) for the purposes of large-scale construction projects, these countries should have the right to do so in the future.

—Statement by the Indian representative in the First Committee of the United Nations, October 31, 1966, in J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), p. 186.

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November 1966

The Indian representative to the Eight Nation Disarmament Committee, Vishnu Trivedi, suggests that the development of peaceful nuclear explosions (PNEs) be permitted for developing countries provided that the explosions be announced and be subject to international observation and inspection.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 130.

November 1966

Major General Son Dutt, director of the Institute for Defence Studies and Analyses, publishes a paper for the Institute for Strategic Studies in London in which he argues that India would not stand to gain from developing nuclear weapons at this time. He recognizes that although India does have a nuclear option, it has "no wish to become a nuclear power." He claims that while the threat from China is mostly "psycho-political," India's security is threatened by the increasing ties between China and Pakistan. However, simply developing a rudimentary nuclear capability will not benefit India because it would undermine India's moral stance and irritate the nuclear powers without providing a suitable deterrent. In addition, the annual costs of maintaining a credible arsenal vis-à-vis China would cost about \$220 million over ten years. He concludes that India should attempt to stabilize relations with Pakistan instead of opting for nuclear weapons.

—Major General D. Som Dutt, *India and the Bomb*, Adelphi Paper Series, no. 30 (London: International Institute for Strategic Studies, 1966), p. 1

December 1966

The United States, India, and the International Atomic Energy Agency (IAEA) sign an agreement allowing the United States to supply a small amount of plutonium to India for research purposes.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 131.

16 December 1966

India and Canada sign an agreement under which Canada agrees to extend its assistance granted by the 1965 bilateral agreement to the design and construction of another nuclear power reactor at Rajasthan, known as RAPS-2. Unlike the previous agreement, the safeguards in this agreement apply ad infinitum to the reactor fuel, and they allow IAEA inspectors to verify compliance.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 131; K.K. Pathak, *Nuclear Policy of India* (New Delhi: Gitanjali Prakashan, 1980), p. 56.

28 December 1966

China conducts its fifth nuclear test.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 128.

Late 1964-Early 1965

Dr. Bhabha seeks a "Plowshare device" or blue prints for a device from the United States.

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 90.

8 January 1965

Prime Minister Shastri attends the annual conference of the Congress Party in Durgapur. He states that while he cannot speak about the future, India's current policy is to develop nuclear energy for "constructive purposes," not to build nuclear weapons. As in 1964, delegates are divided and many urge that the party either support an Indian nuclear weapons program or accept protection from a nuclear umbrella.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 121; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 88.

19 January 1965

Former US presidential science adviser Jerome Wiesner visits Trombay and meets with Dr. Bhabha. Mr. Wiesner is tasked with influencing Indian nuclear policy away from building and detonating a nuclear weapon in response to China's test. The Department of State asks Mr. Wiesner to elicit Indian ideas for possible cooperative projects in the areas of: "plutonium recycling, thorium recycling, training regarding peaceful uses of nuclear energy, and cooperation in space technology" without indicating that the United States will actually commit to such projects.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 93.

21 January 1965

Mr. Wiesner circulates a report of his visit to the White House and the Secretary of State that reads, "Bhabha is anxious to explore availability of Plowshare with you. He is interested in the possibility of making harbors and water reservoirs." Mr. Wiesner recommends that the United States assist India in devising a more accurate cost estimate because Dr. Bhabha continues to underestimate the amount of time and money required to build a crude nuclear device. He cites that Dr. Bhabha's apparent motivation is "authority and resources to move forward without final decision regarding actual explosion."

—Dr. Wiesner, US Embassy (New Delhi), to Secretary of State, cable no. 2054, 21 January 1965, p. 2, FOIA files, India, National Security Archive, Washington, DC in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 93.

21 January 1965

AEC member John Palfrey visits India for the inauguration of the Trombay plutonium reprocessing plant. In response to the information relayed by Mr. Wiesner, the State Department advises Mr. Palfrey to discuss Plowshares with Dr. Bhabha in a general manner. This cable reiterates US intelligence estimates that India could produce a nuclear weapon in about the one to three years from deciding to do so and that a modest program would cost India "no more than \$30-\$40 million."

—State Department to John Palfrey at US Embassy (New Delhi), cable, 21 January 1965, in Virginia Foran, *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 01100., cited in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 93.

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22 January 1965

Prime Minister Lal Bahadur Shastri formally inaugurates India's plutonium reprocessing facility at Trombay (Maharashtra).

—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-1965," p. 1.

22 February 1965

Dr. Bhabha visits Washington, DC for talks on nuclear cooperation and meets with Under Secretary of State George Ball. Dr. Bhabha expresses interest in peaceful nuclear development to counterbalance China's newly found prestige in the region. During these talks, Mr. Ball reiterates the US wish to pursue nonproliferation, whereas, Dr. Bhabha asks for US assistance by way of a plowshare device or a US blue print so that India could produce a device in six months instead of the estimated 18 for a completely indigenous device. To convince the United States to help India in its peaceful nuclear development, Dr. Bhabha explains that the Indian decision against developing nuclear weapons must be supported by gains in peaceful nuclear technology. He indicates that this will be a difficult policy to maintain since India already has the plutonium reprocessing potential to produce "100 nuclear bombs per year" within five years.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 94; US Department of State, memorandum of conversation, 22 February 1965, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 95.

16 March 1965

In a cable to the US Department of State, the US scientific attaché describes the nature of operations at Trombay. He discusses some difficulties the plant has been experiencing with maintenance, noting that the plant has been down for a month due to the length of time required to obtain spare parts from abroad, in particular the United States. He cites that the plant is completely dependent upon imported supplies and that the design of the "dissolving section" was provided by a US firm, despite India's insistence that design was indigenous. The cable also relays information from the plant manager that the plant had likely "experienced an explosion during operation," although this had not been apparent at that time. In addition, the cable calls attention to the change in expectations about the capacity of the plant from "30 tons of rods per year" to five times that amount. The attaché suggests that the United States should not pursue nuclear cooperation and that pursuit of non-nuclear scientific research would better enhance India's scientific reputation.

—Donald Fuller, scientific attaché, US Embassy (New Delhi), to Department of State, Airgram no. A-964, "Trombay and Atomic Energy in India," 16 March 1965, p. 6, Nuclear Non-proliferation Policy, FOIA files, India, National Security Archive, Washington, DC, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 94.

30 April 1965

Chairman of the US AEC, Glenn Seaborg, writes a letter to the Congress Joint Committee on Atomic Energy discussing the possibility of fulfilling Dr. Bhabha's request for a moderate amount of plutonium from the United States for the purposes of research and development.

—AEC Chairman Glenn Seaborg to Joint Committee on Atomic Energy Chairman Chet Holifield, correspondence, 30

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April 1965, Joint Committee on Atomic Energy files, International Affairs, India, National Archives, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 94.

4 May 1965

The Indian delegate to the UN Disarmament Commission elucidates India's five requirements for acceptance of a nuclear non-proliferation treaty: promise by nuclear powers to refrain from transferring nuclear weapons or technology to others; promise by nuclear powers to not use nuclear weapons against non-nuclear states; guarantee from UN to protect states threatened by nuclear weapons states; "tangible progress" toward nuclear disarmament including a test ban treaty, halting production of weapons and means of delivery and cutting existing stockpiles; and promise by non-nuclear states not to obtain or produce nuclear weapons. Indian recommendations juxtaposed with more minimalist US proposals came to shape the debate on the issue within the Committee.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 103.

August-September 1965

India and Pakistan fight a short war over Kashmir. China pledges support to Pakistan but does not engage in military action. Pakistan uses US-supplied weapons against India, despite prior promises not to do so. During the war, the United States cuts off aid to both countries. Both parties agree to a UN cease-fire that takes effect 23 September.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 109.

22 September 1965

The day before the UN cease-fire takes effect, numerous members of Parliament from various parties write a letter to the prime minister to change the official policy on nuclear weapons. The letter reads "India's survival both as a nation and as a democracy, in the face of the collusion between China and Pakistan, [this] casts a clear and imperative duty on the government to take an immediate decision to develop our nuclear weapons."

—Hari Ram Gupta, *India-Pakistan War, 1965*, vol. 1, p. 20, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 103; MP letter quoted in G.G. Mirchandani, *India's Nuclear Dilemma*, p. 39.

Early November 1965

Responding to a question in the Lok Sabha about whether the government had reviewed its non-nuclear posture in light of recent hostilities with Pakistan, Prime Minister Shastri writes that "despite the continued threat of aggression from China, which has developed nuclear weapons, government has continued to adhere to the decision not to go in for nuclear weapons but to work for their elimination. It is hardly necessary to alter this decision in the light of the conflict with Pakistan."

—Quoted in G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), pp. 40-41.

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30 November 1965

The *New York Times* publishes an article based on an interview with the Dr. Bhabha. According to the article, Dr. Bhabha denies that since the war with Pakistan, India has developed nuclear weapons technology to prepare for a nuclear explosion. However, the article also notes that "many observers" expressed their belief that the prime minister may have granted the AEC permission to develop nuclear technology to within three months of an explosion.

—Anthony Lukas, *New York Times*, 30 Nov. 1965, quoted in G.G. Mirchandani, *India's Nuclear Dilemma*, (New Delhi: Popular Book Services), pp. 40-41.

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1964-1960**1964**

The waste evaporation plant set up to handle "medium and low active wastes" from the plutonium reprocessing facility reveals several problems related to the facility. The Department of Atomic Energy (DAE) proposes to carry out "modifications" in the "radioactive portion" of the plant to allow for continuous operations.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 13.

1964

The 40MW CIRUS reactor continues to be operated at its peak level. During 1964, the reactor achieves a total power output and operating time of 8,169MW days and 5,541 hours respectively. This brings the reactor's total power output to 14,543MW and operating time to 17,878 hours since it first became critical in July 1960. Some uranium fuel rods in the reactor are irradiated for "maximum fuel burn-up."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 3.

1964

The Atomic Energy Research Board approves the Reactor Engineering Division's report on a "prototype power reactor." The proposed reactor will be "...fueled by natural uranium dioxide enriched with plutonium and moderated with heavy water. It will have pressurized heavy water as coolant in the inner 37 channels and provision for other test coolants like organic, boiling water, or fog in the surrounding 18 channels." The reactor will be generate 15MW of electric power and is expected to cost 80 million rupees.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 4.

1964

Preliminary work is completed for setting up of a "20-element seismic array for the detection of nuclear explosions" at Gauribidnur, about 47-miles north of Bangalore (Karnataka). The first phase of the project, which involves the setting up of 10 elements of the array, is expected to be completed by the end of 1965.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 6.

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1964

After conducting "pilot plant studies," the Department of Atomic Energy (DAE) finalizes plans for the production of "ceramic grade uranium dioxide" at the uranium metal plant at Trombay (Maharashtra). DAE also plans to expand the uranium metal plant and set up a new plant for the manufacture of "ceramic grade uranium dioxide." Plans are also drawn to set up a plant to produce "hafnium-free zirconium oxide."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," pp. 11-12.

1964

During 1964, 725kg of heavy water is reconcentrated at the Heavy Water Reconcentration Plant. The Department of Atomic Energy (DAE) begins work on a project report to build a heavy water plant with an annual capacity of 200 tons.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 12.

1964

The Department of Atomic Energy's (DAE) Fuel Element Fabrication Facility completes five years of operation. During 1964, 275 fuel elements containing about 15 tons of uranium metal are fabricated at the facility for use in the CIRUS reactor and for experiments in the plutonium reprocessing facility.

—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-65," p. 16.

1964

With the help of air samples collected by the Indian Air Force (IAF), the Department of Atomic Energy's (DAE) Air Monitoring Section determines that China used U-235 as the fissionable material for its first nuclear test on 16 October 1964. The DAE establishes two additional monitoring stations in Nainital (Uttar Pradesh) and Gulmarg (Kashmir).

—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-65," p. 10.

1964

The Department of Atomic Energy (DAE) prepares a "preliminary project report" for the setting up of an enriched uranium fabrication facility to supply uranium fuel elements for the Tarapur Atomic Power Station. However, the enriched uranium is likely to be imported.

—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-65," p. 17.

1964

Subsequent to the successful pilot-scale production of nuclear-grade zirconium sponge, the Department of Atomic Energy (DAE) decides to proceed with the construction with a "full-scale zirconium plant at Trombay (Maharashtra). In addition, a detailed "technical project report" is also prepared to fabricate finished zircaloy sections to meet the requirements of "future nuclear power stations" in India.

—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-65," pp. 17, 19.

1964

The Department of Atomic Energy (DAE) initiates a study for "setting up an experimental fast reactor in the first stage, and later a fast breeder reactor" for exploiting India's vast reserves of thorium. In addition a study is

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commissioned to analyze the design of a Swedish Pressurized Heavy Water Reactor for the use of thorium in India.
—Department of Atomic Energy: Government of India, "Brief Annual Report: 1964-65," p. 22.

1964

The US Atomic Energy Commission conducts an international Plowshare Symposium to fuel international interest in peaceful nuclear explosions (PNE) for large-scale engineering projects.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 90, 498.

1964

According to the US Arms Control and Disarmament Agency National Intelligence Estimate concludes that India employs a "large number" of experts to work on plutonium metallurgy.

—US Arms Control and Disarmament Agency, National Intelligence Estimate paper, "The Indian Nuclear Problem: Proposed Course of Action," October 21, 1964, revised appendix 4, p. 2, Nuclear Non-Proliferation Policy, FOIA files, India, National Security Archive, Washington, DC.

1954-1964

US Arms Control and Disarmament Agency analysts determine that India had spent \$220 million on its nuclear program through the Department of Atomic Energy and that additional amounts could have been concealed in other accounts.

—US Arms Control and Disarmament Agency, National Intelligence Estimate paper, "The Indian Nuclear Problem: Proposed Course of Action," 13 October 1964, app. 3, "Economic Factors," p. 1, Nuclear Non-Proliferation Policy, FOIA files, India, National Security Archive, Washington, DC.

27 January-1 February 1964

The Twelfth Pugwash Conference on Science and World Affairs convenes in Udaipur, India to discuss "Current Problems of Disarmament and World Security." At this conference, Dr. Bhabha presents a paper entitled "The Implication of a Wider Dispersal of Military Power for World Security and the Problem of Safeguards." This paper describes the benefits of nuclear deterrence in the face of asymmetrical capabilities, noting in particular the advantage China enjoys due to the size of its population. Dr. Bhabha suggests that if "any State is to be asked to renounce a possible dependence on nuclear weapons to redress the balance of power against a larger and more powerful State not having nuclear weapons, such as China, its security must be guaranteed by both the major nuclear powers." To keep countries such as India from developing nuclear weapons, Dr. Bhabha indicates that the impetus rests with the United States and the Soviet Union to provide security assurances or lead the way towards nuclear disarmament.

—Homi J. Bhabha, "The Implications of a Wider Dispersal of Military Power for World Security and the Problem of Safeguards," in *Proceedings of the Twelfth Pugwash Conference on Science and World Affairs*, 27 January-1 February 1964, Udaipur, India, pp. 75-78.

April 1964

India and Canada reach agreement on the Canadian financing of the heavy-water moderated CANDU (Canadian

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deuterium-uranium) power reactor, also known as RAPS-1, to be built in Rajasthan by Indian engineers with design assistance and technology provided by Atomic Energy of Canada Ltd. (AECL). The agreement details information sharing and assistance from Canada including blueprints for the facility, as well as a \$37 million loan from Canada to pay the foreign exchange expenses for the services and technology Canada will provide. The safeguards agreement worked out between India and Canada allows for reciprocal inspection rights, whereby Canadians could inspect the facility at Rajasthan and Indians could inspect the Douglas Point power station in Ottawa, Canada. India further promises to use the Canadian technology and fuel only for peaceful purposes.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 242.

31 March 1964

An "unirradiated fuel rod" is fed into the dissolver and processed through the different stages of the plutonium reprocessing facility. Following the success of this process, a few "mildly irradiated" fuel elements are introduced and dissolved to test the "performance and reliability" of the various parts of the plant. The results from the tests are deemed satisfactory, preparing the ground for the introduction of irradiated fuel elements.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 12.

April 1964

The plutonium separation plant at Trombay is completed. In a press release announcing the completion of the facility, the Indian DAE states that the plant "was designed and built entirely by the staff of the Atomic Energy Establishment at Trombay."

—Indian DAE press release, appended to American Consulate (Bombay) to the Department of State, airgram no. A-253, April 29, 1964, p. 2, Nuclear Non-Proliferation Policy, FOIA files, India, National Security Archive, Washington DC.

1964

Prime Minister Nehru approves Dr. Bhabha's memo describing the agreement reached with Canada. Nehru allegedly notes in the margins of the memo: "Apart from building power stations and developing electricity, there is always a built-in advantage of defense use if the need should arise."

—Ashok Kapur, *India's Nuclear Option* (New York: Praeger, 1976), p. 193.

Early 1964

India announces a five-year defense plan that calls for defense expenditures to be doubled to \$2 billion by 1969. This amount makes up 5 percent of India's national income.

—Mitchell Reiss, *Without the Bomb: The Politics of Nuclear Proliferation* (New York: Columbia University Press, 1988), pp. 206-207.

8 May 1964

The Department of Atomic Energy (DAE) and General Electric Company of the United States sign a contract for the construction of two boiling water reactors with a total output of 380,000KW; the reactors are expected to achieve "full power operation" by October 1968. The total cost of the project is estimated at 485 million rupees; fabrication of the initial fuel charge is calculated at 50 million rupees. On the basis of these estimates, DAE projects the cost of

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power from the station at about "3 paise per kilowatt hour."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 46.

27 May 1964

Prime Minister Nehru dies of heart failure.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 60, 63.

1 June 1964

Active fuel from the CIRUS reactor is introduced into the plutonium reprocessing facility, Trombay for the first time.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," p. 1.

2 June 1964

Prime Minister Nehru's successor, Lal Bahadur Shastri, officially assumes duties.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 64.

1964

India produces its first weapon-grade plutonium by reprocessing spent fuel from the CIRUS reactor at the Phoenix plant at Trombay.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 28, 64.

3 August 1964

Dr. Bhabha describes the nuclear facility at Trombay on All-India Radio saying, it is "by far the largest scientific and technical institution in the country, with a staff of some 1,550 scientist and engineers, and a total staff of nearly 7,000."

—Homi. J. Bhabha, "Development of Atomic Energy in India," All India Radio address, 3 August 1964, in Jain, *Nuclear India*, vol. 2, p. 146.

18 August 1964

The "first batch of fully irradiated fuel elements" are charged for processing in the plutonium reprocessing facility, Trombay (Maharashtra). Since then the plant is in put into continuous operation, taking into account safety considerations. The Department of Atomic Energy (DAE) reports that as a consequence of the reprocessing operations, "plutonium in appreciable quantities has been isolated in a pure state in the form of an aqueous solution of its compound and as an oxide."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1964-65," pp. 12-13.

17 September 1964

Dr. Bhabha attends an IAEA meeting in Vienna and states that India welcomes the prospect of utilizing atomic explosions for civil engineering projects, under the supervision of the international community.

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—Statement by Bhabha at the Eighth IAEA General Conference, 17 September 1964 in J.P. Jain, *Nuclear India*, vol. 2, p. 157.

29 September 1964

US Secretary of State Dean Rusk announces that the United States anticipates a Chinese atmospheric nuclear test in the near future. Shortly after this statement is made, Dr. Bhabha undertakes a public and private campaign for authorization from Prime Minister Shastri to conduct more work on the direct military applications of nuclear energy.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 242; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 65.

4 October 1964

On a visit to London, Dr. Bhabha announces that India could detonate a nuclear bomb within 18 months if such a decision were taken; however, he asserts "I do not think such a decision will be taken."

—"Bhabha: India Can Make Atom Bomb in 18 Months," National Herald, 5 October 1964, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 65.

6 October 1964

B.K. Nehru, India's ambassador to the United States, requests that the US secretary of state make a public announcement that "India, like Communist China, has potential to produce nuclear weapons but as good citizen of world India has no intention of producing nuclear weapons" and also commend India for its policy.

—State Department to US Embassy (New Delhi), cable no. 744, 6 October 1964, p. 1, Nuclear Non-Proliferation Policy FOIA files, India, National Security Archive, Washington, DC, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 489.

7 October 1964

Prime Minister Shastri attends a conference of non-aligned nations in Cairo and seeks the support of other states to "persuade China to desist from developing nuclear weapons." Meanwhile, he insists that in India the nuclear establishment is "under firm orders not to make a single experiment, not to perfect a single device which is not needed for peaceful uses of atomic energy."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 25.

13 October 1964

According to the "US Arms Control and Disarmament Agency's National Intelligence Estimate," India's defense budget amounts to \$1.8 billion, or 28 percent of India's total government spending. The spending on activities in the nuclear field amounts to \$63 million, or one percent of the national budget. The "Intelligence Estimate" also concludes that Department of Atomic Energy records indicate that from 1954 through 1964 India, spent \$220 million on its nuclear program, although additional, hidden sources of funding may also exist. During this period there are three varying prices put forward for the cost of developing nuclear weapons: according to Dr. Bhabha a single nuclear device would cost 1.75 million rupees (\$350,000), according to Prime Minister Shastri it would cost 40-50 crore rupees (\$84-105 million), and according to one American scientist a "militarily significant program"

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would cost 25 crore rupees (\$52.5 million) plus and additional 10 crore rupees (\$21 million) for operating expenses.

—US Arms Control and Disarmament Agency, National Intelligence Estimate paper, "The Indian Nuclear Problem: Proposed Course of Action," October 13, 1964, app. 3, "Economic Factors," p. 1, Nuclear Non-Proliferation Policy, FOIA files, India, National Security Archive, Washington, DC, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 69, 79.

16 October 1964

China conducts a test of a nuclear weapon. Prime Minister Shastri declares that the test threatens world peace.

—US Embassy (New Delhi) to State Department, cable no. 1203, 16 October 1964, p. 1, Nuclear Non-Proliferation Policy FOIA files, India, National Security Archive, Washington, DC, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 490.

16 October 1964

Dr. H. Bhabha calls a press conference in London when he hears about the Chinese nuclear test. He informs reporters that, if they wanted to, Indian scientists could also produce a "nuclear bomb" within 18 months.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 113.

October 1964

Defense Minister Y.B Chavan claims that the Chinese nuclear test will not have a significant impact on China's military strength since the short-term threat to India remains China's conventional forces.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 26.

18 October 1964

To reassure India in the wake of China's nuclear test, President Lyndon Johnson announces that the United States would offer its "strong support" for non-nuclear weapons states in the event of nuclear blackmail.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 87.

18 October 1964

Nath Pai, leader of the opposition Praja Socialist Party, challenges Prime Minister Shastri's leadership and states that India should consider obtaining its own nuclear deterrent.

—"Nath Pai Wants to Produce the Bomb," *Indian Express*, 19 October 1964, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 66.

19 October 1964

Prime Minister Shastri tells a radio audience that the India government is not in favor of following the Chinese example of developing and testing nuclear weapons.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 109.

20 October 1964

In a conversation with an official from the US embassy, Joint Secretary of the Ministry of External Affairs V.C.

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Trivedi states that India is committed to keeping its nuclear program limited to peaceful uses, although "no one could at present gauge the degree of pressure that might be mounted on the government to alter its present policy."

—US Embassy (New Delhi) to the State Department, airgram no. A-411, "India's Nuclear Policy in the Wake of ChiCom Nuclear Detonation," 23 October 1964, in Virginia Foran, *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 01016.

21 October 1964

According to a US National Intelligence Estimate, "India, given the facilities it now has, could produce and test a first nuclear device in one to three years after a decision to do so." This estimate calls attention to the apparent discrepancy between the plutonium separation capacity of the plant at Trombay and the needs of the peaceful nuclear program. In addition, the estimate notes that the plant produces weapons-grade plutonium that could be used by metallurgical specialists to construct the cores of nuclear weapons.

—US Arms Control and Disarmament Agency, memorandum for members of the Committee of Principals, "Revision of Appendix 4 of the paper entitled 'The Indian Nuclear Problem: Proposed Course of Action,' dated October 13, 1964," 19 November 1964, p. 2, Nuclear Non-Proliferation Policy FOIA files, India, National Security Archive, Washington, DC, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 67.

22 October 1964

While in Paris, Indian Minister of Information and Broadcasting Indira Gandhi states in a televised interview that "India is in a position to produce the bomb within 18 months. But I think we should not deviate from our stand and should use atomic energy for peaceful purposes only."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 30.

24 October 1964

Dr. Bhabha gives a broadcast on All India Radio, saying that "atomic weapons give a State possessing them in adequate numbers a deterrent power against attack from a much stronger State." He cites a study by US nuclear scientists on peaceful nuclear explosions to support claims about the remarkably low cost of nuclear weapons. He asserts that a 10kt explosion would cost "USD 350,000 or Rs. 17.5 lakhs [1.75 million rupees]" and a "two megaton explosion, i.e. one equivalent to 2 million tons of TNT, would cost USD 600,000 or 30 lakh rupees [three million]." He contrasts this with the "current prices" of TNT, saying that "2 million tons of it would cost some 150 crore rupees [1,500 million rupees]." Dr. Bhabha further calculates that "a stockpile of some 50 atomic bombs would cost under 10 crore rupees [100 million rupees] and a stockpile of 50 two-megaton hydrogen bombs something of the order of 15 crore rupees [150 million rupees]." Dr. Bhabha concludes his broadcast by calling for the United Nations and the "great powers" to pursue nuclear disarmament so that states like India that have voluntarily refrained from developing weapons will not have to do so in the future.

—Homi. J. Bhabha, All India Radio address, 24 October 1964 in J.P. Jain, *Nuclear India*, vol. 2, pp. 159-161.

24 October 1964

Indian Defense Minister Yeshwant Rao Chavan makes a statement reflecting the views of Prime Minister Shastri,

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saying that the Chinese nuclear test will not lead to a change in India's nuclear policies.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 120.

26 October 1964

In its weekly magazine, *Organiser*, the Hindu-nationalist Jana Sangh Party strongly advocates nuclear weapons by stating that "the eunuch government decided years ago in its *ahimsic* (the philosophy of non-violence) idiocy to spend crores on nuclear power but not to use the same crores on developing the nuclear bomb. We had the chance to do it before China did it and so we could tell that we meant business and that we were ahead of China. In our criminal folly we missed it."

—T.T. Poulouse, "India's Nuclear Policy" in Poulouse, ed. *Perspectives of India's Nuclear Policy* (New Delhi: Young Asia, 1978), p. 105.

26 October 1964

Former Defense Minister Y.B. Chavan addresses a public meeting, saying "Our joining the atomic race will only end our non-alignment and hasten war and worldwide destruction. China, by her test, has invited worldwide resentment, whereas India has earned world-wide appreciation." In his opinion, India should neither build nuclear weapons nor accept a nuclear umbrella.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 30.

27 October 1964

The Congress party holds a meeting to draft policy resolutions for adoption at an All India Congress Committee (AICC) meeting to take place on 7 November. Foreign Minister Swaran Singh prepares the draft resolution, which demonstrates approval of the government's current policy of refraining from manufacturing nuclear weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 68.

29 October 1964

An official at the US embassy sends a cable to the US secretary of state in Washington reporting that "there appears to be a considerable body of opinion both within and outside Congress Party which favors Indian construction of bomb regardless of cost and of prior GOI [Government of India] pledges to restrict itself to peaceful uses of nuclear power. Support for moving ahead on bomb construction doubtless was given fillip when Bhabha made the disingenuous statement to radio audience on October 24 that 'atom bomb explosion' on the same dimensions as Hiroshima would only cost India about USD 350,000." On the subject of Prime Minister Shastri, the cable states that he "may well find himself in difficult position if he persists in no-bomb policy. His opponents within Congress are likely to make efforts to capitalize on the issue, which is ready-made for those who have alleged that Shastri (unlike Morarji) would be a 'weak' [prime minister]."

—US Embassy (New Delhi) to Secretary of State, cable no. 1323, 29 October 1964, in Virginia Foran, *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 01031.

29 October 1964

A second cable from the US embassy in New Delhi to Washington reports that an official from the Indian Ministry

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of External Affairs told the embassy that internal pressures to "develop its own bomb" were increasing and that Dr. Bhabha was "the leading advocate for this group, and he was actively campaigning to go down nuclear road."

—US Embassy (New Delhi) to Secretary of State, cable no. 1323, 29 October 1964, in Virginia Foran, *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 01031.

29 October 1964

According to the US Arms Control and Disarmament Agency, Indian Minister of External Affairs Swaran Singh and Minister of Railways S.K. Patil unite with Dr. Bhabha in advocating a program to develop nuclear weapons during a cabinet meeting on nuclear policy. Only two cabinet ministers, Defense Minister Y.B. Chavan and Food and Agriculture Minister C. Subramaniam, oppose Indian development of nuclear weapons. A source from the Ministry of External Affairs claims that the "discussions had gone far enough for Shastri to authorize Bhabha to come up with estimate of what was involved in India's attempting an underground 'explosion'."

—Robert Rochlin, US Arms Control and Disarmament Agency, memorandum, "Comments on Non-Proliferation Background Papers of December 12, 1964," 31 December 1964, p. 2 Nuclear Non-Proliferation Policy, FOIA files, National Security Archive, Washington, DC; US Embassy (New Delhi) to Secretary of State, cable no. 1323, October 29, 1964, in Virginia Foran, *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 01031.

2 November 1964

At a press conference M.R. Masani, General Secretary of the Swatantra Party, advocates that India seek protection of a US nuclear umbrella instead of pursuing indigenous nuclear weapons development. He says, "A nuclear force, in order to act as a deterrent, must be vastly superior to that of the enemy. It is highly problematic whether India would ever be capable of achieving such superiority over Communist China."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 27.

7 November 1964

During a session of the All-India Congress Committee (AICC) held in Guntur, Uttar Pradesh, a group of delegates led by Congress Parliamentary Party General Secretary, Bibhuti Mishra, argues that the Congress policy should support the indigenous manufacture of nuclear weapons. He upholds that the benefits of having nuclear weapons would be a better defense against China, a heightened sense of national morale, and the restoration of Indian leadership in South Asia. Mishra states, "If we do not decide today to make the bomb, events will force us after some time to do so. If suddenly China attacks us, we will have to seek the help of the USA or Russia. This should not be. We must have our own bomb." Also during this session, more than 100 Congressmen sign a document that requests a "secret session" be held during the 1965 meeting of the AICC in Durgapur to discuss the development of nuclear weapons in more detail.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 110-111, 122.; G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 28.

8 November 1964

Despite discussions in support of a pro-nuclear weapon policy, the AICC resolution of 8 November endorses the existing party policy, which supports the development of nuclear energy for strictly peaceful purposes. However, the resolution also advocates that the government "re-double" its work in the development of peaceful nuclear

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energy in order to benefit the Indian people. At this time Prime Minister Shastri proclaimed, "we will try to eliminate the threat and terror of nuclear weapons rather than enter into competition with other countries to make or produce atom bombs here."

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 111; G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 29.

10 November 1964

Prime Minister Shastri makes a public statement that India should work toward the elimination of nuclear weapons instead of building them.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 120.

17 November 1964

Dr. Bhabha tells the press that he opposes "India being stampeded into developing [a] nuclear arsenal merely because China has detonated a nuclear device." He also restates that his conclusions about the cost of developing a peaceful nuclear explosion came from information from US scientists and that he would stand by those figures.

—*Times of India*, 18 November 1964, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 75.

20 November 1964

Defense Minister Chavan makes a statement in response to the Chinese nuclear threat saying that "If any country uses nuclear weapons, it would not remain a local conflict. It would mean escalation into a major war. If such a war were to break out, we have friends to support us."

—*Times of India*, 21 November 1964, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 77.

Late November 1964

As a result of the Chinese nuclear test, the US Atomic Energy Commission (AEC) includes Plowshare projects with other areas of proposed cooperation with India to counterbalance the impact of China's test. A discussion paper from the AEC mentions interest on behalf of the World Bank and various US agencies in "the role nuclear excavation projects might play in solving some of India's basic river problems." This paper also expresses that the United States and Dr. Bhabha conduct preliminary talks on the issue of a US-India assessment of Plowshare applications that could make use of "US devices, under sole US control."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 91.

23-25 November 1964

During its winter session, the Lok Sabha (lower house of parliament) holds a debate on international affairs, which erupts into a nuclear weapons row. The debate centers on interpretations of China's motivations and how Indian should respond. The opposition Jan Sangh Party takes the lead in advocating the Realist approach that India develop nuclear weapons to negotiate with the international community from a position of strength, regardless of cost. Congress Party members argue that nuclear weapons are linked to international prestige more so than

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security and that is why India should leave its options open. Those who oppose Indian nuclear weapons development make two claims in regard to China: first, China was able to put the money toward nuclear weapons because it lacked the democratic decisionmaking that would put societal needs first; and second, Russia provided technological assistance to China and that cooperation would continue. Under such circumstances, India would not be able to maintain its policy of non-alignment and should therefore seek nuclear protection from the United States. Following this debate, Prime Minister Shastri says that the government will proceed with the development of nuclear energy only for peaceful purposes. However, his statement that "Our policy stands, but who can guarantee what will happen in the future," indicates that the nuclear debate is not over.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 76, 111-12; Lok Sabha Debates, 23 November 1964, col. 1280, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 77; "PM Rejects Plea for Change in Atoms-for-Peace Policy." *Hindustan Times*, November 24, 1964, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 68.

26 November 1964

The Executive Committee of the Congress Parliamentary Party meets to continue the nuclear debate and to attempt to sway the prime minister to change his stance. Party leaders recommend enhancing nuclear science and investigating the implications of the Chinese test. A colleague of Dr. Bhabha, K.C. Pant, suggests that India should develop its capacity to manufacture a nuclear weapon quickly in case of necessity.

—"Shastri's Stand on Bomb Issue," *Times of India*, 27 November 1964, p. 1, in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 68.

27 November 1964

The Lok Sabha (India's lower house of parliament) holds another nuclear debate. The Jana Sangh Party introduces a resolution calling for the manufacture of nuclear weapons. The Swatantra Party is more hesitant, reiterating Masani's suggestion to seek US nuclear protection; however, acknowledging that if this protection is not sought or is not available, the Indian government should encourage the development of a domestic nuclear weapons capability. The Communist Party criticizes the resolution and supports the government's current position against developing nuclear weapons. Prime Minister Shastri intervenes in the debate, instructing a Jan Sangh MP to refrain from quoting Dr. Bhabha out of context in regard to the potential for inexpensive development of nuclear weapons. He announces that Dr. Bhabha fully supports his policy and says that while they oppose building nuclear weapons, he clarifies that they are in favor of peaceful nuclear developments, including nuclear explosives for use in building tunnels and other such large-scale industrial projects.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 113, 120; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 82.

4 December 1964

The Jan Sangh Party formalizes its support for a policy to develop nuclear weapons in a resolution of the Party's General Working Committee. The resolution states that the Committee "considers it imperative that an all out effort be made to build up an independent nuclear deterrent" and it urges the government to reverse its policy of opposition to nuclear weapons development.

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—R.L.M. Patel, *India: Nuclear Weapons and International Politics* (Delhi: National, 1961), p. 79, cited in Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 112.

4 December 1964

In a memorandum on the review of US nonproliferation policy, the deputy under secretary of state includes a preliminary study on the implications of providing nuclear weapons "under US custody" to "friendly Asian" militaries in cases of threat or attack by China. The memo anticipates that military units in these countries would have to be trained to handle and deliver the weapons by US personnel. India is given special consideration for this plan since the United States hopes to preclude an independent national program. US officials estimate that India would be able to indigenously develop and test its own nuclear device one to three years after deciding to do so and by 1970 could produce "about a dozen weapons in the 20kt range."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 91-92.

5 December 1964

While in London, Prime Minister Shastri tells the press that he has spoken with British Prime Minister Harold Wilson about the possibility of nuclear assurances from the "great powers" to deter nuclear threats from China.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 121.

7 December 1964

Prime Minister Shastri clarifies that in his discussions with Prime Minister Wilson, he was concerned about protection for all nations without nuclear weapons, not only India, and that in regard to the United States and the Soviet Union, it is their responsibility to prevent nuclear proliferation and that the best way to do so is through the complete elimination of those weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 87.

8 December 1964

Secretary General of the Ministry of External Affairs R.K. Nehru delivers a speech at a meeting of the Indian Council of World Affairs. He declares that the government remains devoted to its policy of peaceful uses of nuclear energy and that suggestions to seek super power protection against China and to develop an indigenous nuclear weapon capability have been rejected. He states that the Indian government made this decision based on India's commitment to limiting the proliferation of nuclear weapons in the hope of achieving disarmament on a global scale and on the finding that China's motives for developing nuclear weapons were purely political. He concludes that it would take China six to seven years to build a "minimum size" nuclear arsenal and that, lacking Soviet support, China would be unlikely to develop a "modern" delivery system.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 119.

1963

Prime Minister Nehru is one of the first world leaders to sign the Partial Test Ban Treaty (PTBT). He proclaims that

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it "will take us towards disarmament and peace."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 240.

1963

Representatives from the Department of Atomic Energy (DAE) and General Electric conclude a draft contract on the construction of the Tarapur nuclear power station. According to the plans, construction will be completed by the end of 1967 and the reactors will attain full power by the mid-1968. DAE speculates on the possibility of adding additional capacity to the Tarapur plant in the future.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 20.

1963

India and Canada sign two agreements on cooperation in the peaceful use of nuclear energy. Under the first agreement, the Atomic Energy of Canada Limited (AECL) "will enable a free exchange of scientific and technical information between the two parties for the development of heavy water moderated reactor systems. It will also enable either party to obtain at no cost information and detailed design data, including plans and working drawings regarding the design and construction of nuclear power stations of the heavy water type." Under the second agreement, Canada agrees to cooperate with India in the construction of the Rajasthan Atomic Power Station (RAPS). Canada agrees to provide the "design, detailed working drawings and specifications for the power station up to the steam raising equipment, while India will provide the design for the rest of the station." Canada also agrees to supply half of the initial uranium fuel charge for the reactor; the other half will be fabricated in India. The government of Canada also agrees to extend credit (not exceeding \$36 million) to cover nearly 50 percent of the total cost of the RAPS project.

[Note: The total cost of RAPS is estimated at \$76 million.]

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 21.

1963

According to the Department of Atomic Energy (DAE), the Jaduguda uranium mines are being developed to "enable the production of nearly 1,000 tons of uranium ore per day." In addition, a uranium mill to process the ore is being set up near the mines. Orders for the most of the equipment for the mill are expected to be place before the end of March 1964.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 21.

1963

India concludes cooperation agreements on the peaceful uses of nuclear energy with Denmark and Poland.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 25.

1963

The Department of Atomic Energy (DAE) designs and fabricates distillation columns to re-concentrate downgraded heavy water. The existing facilities can re-concentrate 45kg of downgraded heavy water per month. The DAE plans to double this capacity by 1964.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 12.

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1963

Considerable progress is made in Project Phoenix, the facility to process irradiated fuel from India's nuclear reactors. The Department of Atomic Energy (DAE) completes construction of the "main process building, rod handling building, filter house, organic waste laboratory, oil storage tank, and waste treatment building..." Construction of the "underground tanks for the storage of high active waste" nears completion. The plant's 450ft-high reinforced concrete stack is completed and progress is made in laying underground exhaust ducts. Other significant milestones in the project include the fabrication of the plant's equipment, progress in the Waste Evaporation Plant, and installation and commissioning of utilities. The first phase of the plant is likely to be commissioned by April 1964.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 13.

1963

The atomic energy establishment's Remote Handling Section completes work on the design and setting up of an isotope production unit and a hot cell for handling highly radioactive materials.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, p. 13.

1963

The Department of Atomic Energy (DAE) plans to set up a Zircaloy Fabrication Plant with an initial annual capacity of 50 tons of "finished zircaloy components..." At a later stage, the plant's capacity will be expanded to 75 tons. Plans are also made to build a zirconium sponge plant with an annual capacity of 60 tons. The zirconium sponge plant and the zircaloy fabrication facility are expected to meet the zircaloy requirements for the half the initial fuel loadings required for the proposed Tarapur and Rajasthan nuclear power plants.

—"Brief Annual Report: 1963-64," *Department of Atomic Energy, Government of India*, pp. 14-15.

Late 1962-Early 1963

Prime Minister Nehru responds to questions about whether India intends to permanently eschew a nuclear deterrent. He cites that one must have a "very powerful deterrent" because having "something showy" will not bolster the Indian situation if China were to conduct a nuclear test tomorrow. Therefore, he states that India is "not going to make bombs, not even thinking of making bombs," despite his belief that Indian nuclear science is more advanced than that of China.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 22.

12 February 1963

In a memo to the president of the United States, the Secretary of Defense endorses a comprehensive test ban and expresses concern over possible nuclear weapons proliferation in the absence of a test ban agreement. He cites the estimates of Pentagon officials that eight countries, including India, would be able to obtain basic nuclear weapons capability in the next ten years. The memo notes that the production costs of "a few weapons would come to about 150-175 million dollars," and that "[m]any countries have reduced the lead time and cost of acquiring weapons by getting research reactors and starting nuclear power programs." The analysis of India's program concludes that it could conduct its first nuclear test within four to five years; however, its motivation for such a test is low and depends upon its perception of threats from China.

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—Secretary of Defense to the President, memorandum, "The Diffusion of Nuclear Weapons with and without a Test Ban Agreement," February 12, 1963, p. 1, in Virginia Foran, ed., *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 00941.

23 March 1963

Ramachandra Bade, a member of the Jana Sangh Party, calls for developing nuclear weapons during a parliamentary discussion of the Department of Atomic Energy (DAE) budget. Bade argues, "Only those who wish to see Russians or Chinese ruling India will oppose the development of nuclear weapons. I beg the Prime Minister to make full use of our research in atomic energy." Prime Minister Nehru responds that India cannot call for the nuclear powers to renounce their nuclear tests and then "go in for doing the very thing which we have repeatedly asked the other powers not to do" to justify the minor psychological advantages that nuclear status would confer.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 108-109; G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 23.

25 March 1963

Prime Minister Nehru tells parliament, "We have often said, from the very first day we started the reactor in Bombay, that we on no account would manufacture nuclear weapons....I hold to that."

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 121.

8 August 1963

The Agreement for Cooperation between the government of the United States and the government of India concerning the civil uses of atomic energy is signed in Washington. According to the terms of this agreement, the United States will supply two 200MW reactors, to be housed in one building at Tarapur, India. In exchange, India agrees to only use enriched uranium fuel provided by the United States and to allow the International Atomic Energy Agency (IAEA) to verify that the fuel at this facility is not diverted from peaceful uses. The United States further stipulates that any subsequent separation of plutonium during spent fuel reprocessing must be approved by the US government. The agreement clearly spells out that any material received by India must not be used "for atomic weapons or for research on or development of atomic weapons or for any other military purpose." To finance the project, the United States offers a \$80 million credit at 0.75 percent interest over 40 years.

—Agreement for Cooperation between the Government of the United States of America and the Government of India Concerning the Civil Uses of Atomic Energy, signed in Washington, 8 August 1963, and entered into force 25 October 1963, Article VII, reprinted in Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), pp. 26, 318-327.

25 October 1963

The Agreement for Cooperation between the government of the United States and the government of India concerning the civil uses of Atomic Energy enters into force.

—Agreement for Cooperation between the Government of the United States of America and the Government of India Concerning the Civil Uses of Atomic Energy, signed in Washington, 8 August 1963, and entered into force 25 October 1963, Article VII, reprinted in Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), pp. 318-327.

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1962

India receives seven tenders for the proposed nuclear power station at Tarapur; of these, the Department of Atomic Energy (DAE) finds the proposal from the International General Electric Company of the United States most suitable. India submits a "qualified" letter of intent to the company and begins negotiations on issues related to "financing, fuel supply, safeguards, and allied matters."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 11.

1962

According to the Department of Atomic Energy (DAE), the proposed nuclear power plant at Tarapur (Maharashtra) will comprise two boiling water reactors and have a net capacity of 380MWe. The capital outlay for the station, including costs of site development, housing, taxes, and escalation, is estimated at 483.5 million rupees, of which 323.5 million rupees will be spent in the form of foreign exchange. The cost of power is estimated at 3.25 nP. per KWH, which according to the DAE compares favorably with the cost of generating conventional thermal power in the Indian states of Gujarat and Maharashtra. India applies for a loan to the US Agency of International Development to finance the foreign exchange component of the Tarapur reactor project.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 11.

1962

On completion of a study by a joint Indo-Canadian technical team, the Department of Atomic Energy (DAE) decides to build a second nuclear power reactor in the vicinity of the Rana Pratap Sagar near Kotah, Rajasthan. This reactor will be of the CANDU type and will have an initial capacity of 200MWe. Total costs for this project are estimated at 320 million rupees. Unlike the Tarapur power station, which will be built by General Electric under a turnkey contract, the Rajasthan reactor will be built by Indian scientists and engineers on the basis of designs obtained from Canada.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 12.

1962

The Department of Atomic Energy (DAE) says that no decision has been made on the "installation" of India's third proposed nuclear power station. However, when such a decision is made, the reactor is most likely to be located at Kalapakkam, near Mahabalipuram in Madras state.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 12.

1962

The Department of Atomic Energy (DAE) reports progress in developing the Jaduguda uranium mines in Bihar state. The total number of personnel involved in mining operations includes 187 officers and related staff, and "361 daily-rated workers." Two mining consultants from the USSR visit Jaduguda to advise the DAE on rock formations and speeds for drilling to help it with the sinking of main shaft at the mine. The DAE also decides to set up a uranium mill at Jaduguda to treat uranium ore from the mines. The latter project will be executed by Indian Rare Earths Ltd. with assistance from foreign entities. Work begins on the design and procurement of equipment for the plant.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," pp. 8, 13.

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1962

India and the United Arab Republic (UAR) sign an agreement on the development of atomic energy for peaceful purposes. A small number of scientists from the UAR arrive in India for training.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 14.

1962

According to the Department of Atomic Energy (DAE), the CIRUS research reactor operates steadily at power levels of 5-10MW, enough to meet "present requirements for research and radiation." In December 1962, the reactor's power level was raised to 15MW; DAE hopes that the power level will be raised to 40MW by 1963. The CIRUS is now fueled entirely by uranium pellets fabricated in India at Trombay (Maharashtra). Since the reactor first achieved criticality in August 1960, its total output amounts to "1,736MW days."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 3.

1962

The Department of Atomic Energy (DAE) achieves considerable progress in Project Phoenix, which involves the setting up of a plant to process irradiated fuel elements from India's nuclear reactors. In 1962, the "main process building" nears completion. The boiler house and electrical sub-station are completed and their equipment commissioned. The "waste treatment building, the rod handling building, the filter house, the underground storage tanks for waste products, and the 450ft-high stack are under construction." Project Phoenix is being undertaken by the atomic energy establishment's Chemical Group in Trombay (Maharashtra). The Remote Handling Section of the Chemical Group makes progress in the design of a number of facilities for handling irradiated fuel from the CIRUS reactor. This includes a facility for handling irradiated fuel elements under 15ft of water.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," pp. 3-4, 8.

1962

A uranium pilot plant at Ghatsila (Bihar) begins pilot plant testing of uranium ore from Jaduguda and other uranium mines. About 100 tons of Jaduguda uranium ore are processed at the plant and the data obtained is used to design the uranium mill to be set up there.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," pp. 3, 7-8.

1962

As India's Tarapur and Rajasthan nuclear power reactors are likely to use uranium oxide (UO₂) as fuel, the atomic energy establishment's Metallurgy Division focuses on developing technology uranium oxide fuel elements. The Metallurgy Division succeeds in producing uranium pellets "having a sintered capacity of 95 percent theoretical." The division also prepares a flow sheet for the preparation of reactor grade zirconium.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 8.

1962

India sends 76 nuclear scientists abroad for training.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 11.

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April 1962

India's third research reactor, Zerlina, goes critical.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 3.

21 September 1962

The Indian government enacts the Atomic Energy Act, 1962, which replaces the Atomic Energy Act of 1948. The Act allows for enhanced secrecy and mandates central governmental control over atomic energy. The act encompasses "the development, control and use of atomic energy for the welfare of the people of India and for other peaceful purposes and for matters connected therewith."

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 1; K.K. Pathak, *Nuclear Policy of India* (New Delhi: Gitanjali Prakashan, 1980), p. 80.

21 November 1962

China calls a unilateral cease-fire to end the border conflict with India that had been intensifying since mid-1962.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 39,46.

December 1962

In response to India's defeat by China in the Indo-Chinese border war of October-November 1962, the opposition Jana Sangh Party makes a formal demand in Parliament for the reversal of India's declared policy in order to produce nuclear weapons.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), pp. 39, 46.

1961

The Indian Planning Commission publishes its third Five-Year Plan (1961-1966). The plan proposes a three-phase plan for the Indian nuclear program in order to take advantage of India's abundant thorium reserves, which contain uranium-233. First-phase reactors would be fueled by natural uranium and would produce both plutonium and electricity. Second-phase reactors would be fueled by plutonium and thorium to produce electricity and uranium-233. The uranium-233 would then be used to fuel third-phase reactors. The report estimates the cost of nuclear power would be comparable to the cost of coal-based power stations in isolated areas. The final phase of nuclear power would be cheaper due to the use of uranium-233, which would be extracted from local thorium reserves. The report estimates that the first two nuclear power stations would cost 510 million rupees; therefore, this sum was earmarked for the five-year period from 1961-1966, along with 240 million rupees for the construction of uranium mining and fabrication plants. This sum constitutes 7.21 per cent of all investment for India's power program during the five-year period.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 102-103.

Early 1961

With research reactors already in operation, India expresses interest in making contracts with foreign firms for the construction of India's first nuclear power plants.

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—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 52.

9 January 1961

Prime Minister Nehru tells the National Development Council India is nearing a stage from which it may be possible to "make atomic weapons."

—Leonard Beaton and John Maddox, *The Spread of Nuclear Weapons* (New York: Praeger, 1962, for Institute for Strategic Studies), p. 144.

14 January 1961

Prime Minister Nehru announces that India's third research reactor has gone critical and, in a statement to the National Development Council, he says that India could make nuclear weapons "within the next two or three years"; however, this announcement is made with the caveat that "absolutely under no circumstances shall we do so."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 235.

16 January 1961

Dr. H. Bhabha indicates his intention to extract reprocessed plutonium for use in future reactors. He states, "Work is in hand on the construction of a small plant at the northern end of this site [Trombay] for the reprocessing of the used fuel elements, the separation of radioactive fission products, and the extraction of the valuable plutonium or uranium-233 contained in them....Since India has the world's largest deposits of thorium in very high grade ore, it is essential that we should find a means of using the thorium for power production. This can only be done if we have at our disposal a concentrated fissionable material like plutonium which is naturally generated in the uranium fuel elements used in atomic reactors. The only other way of obtaining such concentrated fuels, namely by the extraction of uranium-235 from natural uranium, is extremely expensive both in capital and in running costs and consumes large amounts of electricity. We have, therefore, decided to follow the more economical way, of using plutonium produced in power stations fuelled with natural uranium."

—B.V. Sreekantan, Virendra Singh, and B.M. Udgaoankar, eds., *Homi Jehangir Bhabha: Collected Scientific Papers*. (Bombay: Tata Institute of Fundamental Research, 1985), p. 976.

2 February 1961

In response to a question about the length of time it would take to make nuclear weapons, Dr. Bhabha replies "about two years I suppose."

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 38.

3 February 1961

Dr. Bhabha announces that India is seeking contracts with foreign firms to build nuclear power plants. In particular, Dr. Bhabha hopes to make contracts for reactors to be built quickly and with minimum safeguards requirements. To encourage the participation of Western firms, Dr. Bhabha indicates that Indo-Soviet nuclear cooperation is

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gaining momentum.

—"Setting Up Nuclear Power Plant," *Statesman*, 3 February 1961, p. 1.

3 February 1961

Dr. Bhabha lobbies for popular support of nuclear power in India, arguing that resources that are invested in the present will lead to economic benefits in 10 to 15 years. According to Dr. Bhabha, India will be spared from on-going foreign exchange expenditures by uranium-fueled reactors because India could produce the fuel indigenously. In addition, he states that India may be able to produce breeder reactors in five years.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 37.

28 February-18 March 1961

A US team visits India to evaluate the possibility of supplying India with technology for its nuclear power program.

—Roberta Wohlstetter, *"The Buddha Smiles": Absent-Minded Peaceful Aid and the Indian Bomb* (Los Angeles: Pan Heuristics, 1977), p. 82-86.

3 March 1961

In connection to the possible contract for the US construction of two light water nuclear power reactors at Tarapur, India, US Secretary of State Dean Rusk sends an airgram to US Embassies revealing the general awareness among American officials that India's nuclear program could produce atomic weapons.

—Secretary of State Dean Rusk to US Embassies, airgram, circular CG-769, 3 March 1961, in Virginia I. Foran, ed., *US Nuclear Non-Proliferation Policy, 1945-1991*, no. 0075.

27 March 1961

Construction of the spent fuel reprocessing plant at Trombay begins. The plant, named Phoenix, is based on the Purex (plutonium-uranium extraction) reprocessing technique developed by the United States and promoted on a global level through the Atoms for Peace program's declassification of such information. The US firm, Vitro International, is contracted to prepare the blueprints; however, Indian engineers modify the plans during the actual construction of the plant.

[Note: The Purex process involves four main steps: (1) decladding—one of a variety of processes that is used to either open or dissolve the cladding of an irradiated uranium fuel rod to expose the contents; (2) dissolution of irradiated fuel—the contents of the fuel rod are dissolved in nitric acid and become nitrates in a solution while the dissolved cladding is separated and processed; (3) separation of plutonium and uranium—the nitrate solution is exposed to a mixture of the solvent tributyl phosphate (TBP) and kerosene, which separates the plutonium and uranium from the fission products; and (4) separation of plutonium and uranium from each other—once plutonium and uranium are separated by solvent extraction, they remain in solution as plutonium nitrate and uranium nitrate, prior to shipping the plutonium is typically converted into a solid oxide and uranium is typically converted into uranium trioxide.]

—Roberta Wohlstetter, *"The Buddha Smiles": Absent-Minded Peaceful Aid and the Indian Bomb* (Los Angeles: Pan Heuristics, 1977), pp. 63-64; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 28; Institute for Energy and Environmental Research, www.ieer.org.

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August 1961

According to the Indian AEC's projections, Indian nuclear power plants would produce 3,000 megawatts of electricity by 1976.

—"India's Drive for Atomic Power," *Times of India* (Mumbai), 20 August 1961.

13 September 1961

In a top secret memorandum to Secretary of State Dean Rusk, US State Department official George McGee cites concern over "intelligence estimates that China could detonate a nuclear device as early as 1962." To counter the perception of China's power, McGee expresses the belief of State Department officers "that it would be desirable if a friendly Asian power beat Communist China to the punch" of exploding a nuclear device and that there is "no likelier candidate than India." McGee suggests that the US government should consider whether technical assistance from the United States could help persuade India to explode a nuclear device before China. The memo compares a statement made by Prime Minister Nehru on 31 August 1961 expressing opposition to nuclear tests "at any time in any place" to a statement made on the same day by an Indian government spokesman in New Delhi who makes an exception for "peaceful purposes under controlled conditions." Although McGee suggests that there is but a low probability that Prime Minister Nehru would agree to such a plan, he enumerates arguments to employ to persuade Nehru. These arguments include the ability to prevent Chinese nuclear blackmail against India, reduce Chinese intimidation of India's neighbors, and preclude any opportunity for India's Communist Party to claim that a Chinese test demonstrates the superiority of communism.

—McGhee to Rusk, "Anticipatory Action Pending Chinese Communist Demonstration of a Nuclear Capability," pp. 1-5, September 13, 1961, FIOA files, India, National Security Archive, Washington, DC.

6 October 1961

India signs an agreement to cooperate in the peaceful uses of atomic energy with the Soviet Union.

—A. Appadorai and M.S. Rajan, *India's Foreign Policy and Relations* (New Delhi: South Asian Publishers Private, 1985), p. 273.

7 October 1961

US Secretary of State Dean Rusk writes a memo to State Department Executive Secretary Lucius Battle in which he rejects McGee's proposal to convince India to explode a nuclear device before China. He notes that he is "not convinced we should depart for our stated policy that we are opposed to further extension of national nuclear weapons capability."

—Secretary of State Dean Rusk to State Department Executive Secretary Lucius Battle, memorandum, 7 October 1961, Nuclear Non-Proliferation Policy, FOIA files, India, National Security Archive, Washington, DC.

1960

Indian technicians load the CIRUS research reactor with indigenously produced fuel rods.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 121.

1960

Dr. Bhabha meets with US military engineer Major General Kenneth D. Nichols to discuss plans to build India's first

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nuclear power reactor. Nichols, who had supervised the plants that produced enriched uranium and plutonium for the Manhattan Project, visits India as a consultant to Westinghouse and chairman of the board of Westinghouse International Atomic Power Company in Geneva, Switzerland. Nichols first persuades both Dr. Bhabha and Prime Minister Nehru of the superiority of US light water reactors over British gas-cooled reactors. Nichols claims that, in the ensuing conversation between Prime Minister Nehru and Dr. Bhabha, Nehru asks Dr. Bhabha if he can "develop an atomic bomb." Upon receiving confirmation from Dr. Bhabha that he could do so in about a year, Nehru asks Nichols if he agrees with Dr. Bhabha's assessment. Nichols tells Nehru that he knows "of no reason why Bhabha could not do it." Nehru concludes the conversation by telling Dr. Bhabha, "Well, don't do it until I tell you to."

—Kenneth D. Nichols, *The Road to Trinity* (New York: Morrow, 1987), pp. 351-352.

February 1960

In light of the 1959 assessment by a US team that the capital costs for construction of nuclear power plants would exceed that of conventional power plants, Dr. Bhabha asks the United States to provide favorable terms of finance. The terms he requests include an Export-Import Bank loan and a deferred payment plan, to be repaid in rupees, for the reactor fuel that India would import from the United States.

—Dwight A. Ink, general manager of the AEC, to John McCone, chairman of the AEC, memorandum, 15 February 1960, in Virginia Foran, ed., *US Nuclear Non-Proliferation Policy 1945-1991*, no. 00625.

March 1960

Prime Minister Nehru reassures the Indian public that India is "determined not to go in for making atomic bombs and the like." Meanwhile he cautions the international community that India is "equally determined not to be left behind in this advance in the use of this new power."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 15.

10 July 1960

The CIRUS research reactor goes critical.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 3.

August 1960

Prime Minister Nehru announces in the Lok Sabha that India will construct its first nuclear power station at Tarapur and will follow through on proposed plans to build a plutonium separation facility at Trombay.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 37.

September 1960

Prime Minister Nehru meets with President Eisenhower at the fall UN General Assembly session. Nehru resumes India's traditional push for progress on a nuclear test ban. However, Eisenhower's response is pessimistic due to the inability to make progress with the Soviet Union about verification of arms control.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 51.

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Late 1960

Russian diplomatic emissary and metallurgist V.S. Emelyanov confides to a US official that Dr. Bhabha had been "pressing" him to make an arrangement for Russia to supply India with a nuclear power plant. Mr. Emelyanov expresses his belief that such an arrangement would be premature. Furthermore, he warns that "India might be interested in atomic weapons in the future. India could make weapons from the plutonium that would be produced in the natural uranium reactors if Dr. Bhabha wished."

—Memorandum of conversation between AEC Chairman John McCone and V.S. Emelayanov, 19 November 1960, in Virginia Foran, ed., *US Nuclear Non-Proliferation Policy, 1945-91*, no. 00701.

November 1960

Dr. Bhabha travels to Canada to enhance Indo-Canadian cooperation on nuclear issues.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 37.

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1959-1955**1959**

According to the Department of Atomic Energy (DAE) Annual Report for 1958-59, the number of scientists and engineers working at Trombay has doubled since the last report to approximately 700. The formation of working groups in engineering, chemistry, radio chemistry, medical health, and biology has contributed to this increase. In addition, the number of graduate scientists and engineers admitted to the Trombay training institute has increased to 350.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 98-99.

1959

The atomic energy facilities at Trombay employ over 1,000 scientists and engineers by 1959.

—Homi Bhabha, statement at the Third IAEA General Conference, September 25, 1959, in J.P. Jain, *Nuclear India*, vol. 2, p. 91.

1958 and 1959

The Indian government spends 27 percent of its research and development budget on the Atomic Energy Commission (AEC), which receives 77.6 million rupees in 1958 and 1959.

—Itty Abraham, "India's 'Strategic Enclave': Civilian Scientists and Military Technologies," p. 242.

10 March 1959

During the annual debate on the Department of Atomic Energy (DAE), two members of parliament introduce motions calling for discussion of India's need to expand nuclear research for defensive purposes. The impetus for such proposals stems from Chinese statements made in mid-1958 about their determination to produce nuclear weapons. Prime Minister Nehru responds by assuring parliament that India's nuclear research is "more advanced

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and more widespread" than all nations, with the exception of the advanced powers.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), pp. 12-13.

November 1959

A team of American researchers concludes that the operating costs of nuclear plants in India that are located far from coal fields would be similar to the operating costs of conventional power plants at the same locations. However, the construction costs for nuclear plants would greatly exceed those of conventional plants.

—Atomic Energy Commission, memorandum of record, November 13, 1959, pp. 1-2, Joint Committee on Atomic Energy files, International Affairs, India, National Archives.

December 1959

The Indian parliament's Consultative Committee on Atomic Energy holds a private meeting at which it discusses the possibility of China obtaining a nuclear weapon. During this discussion Dr. Bhabha expresses his view that India's nuclear program has developed to the point where India could indigenously produce nuclear weapons.

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 13.

1958

The Indian government formally adopts the three-stage nuclear power plan for India's economic development. [Note: The three-stage plan was outlined by Dr. Bhabha at the Conference on the Development of Atomic Energy for Peaceful Purposes in New Delhi in November 1954.]

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 158.

30 January 1958

Prime Minister Nehru speaks about how India would respond if nuclear weapons were stationed in Pakistan or another Asian country. He says, "We have the technical know-how for manufacturing the atom bomb. We can do it in three or four years if we divert sufficient resources in that direction. But, we have given the world an assurance that we shall never do so. We shall never use our knowledge of nuclear science for purposes of war."

—G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 231.

24 March 1958

Prime Minister Nehru announces in the Lok Sabha (lower house of parliament) that the government is considering a 15-year plan for the development of nuclear energy in India. Details of this plan are never published.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 101.

July 1958

Prime Minister Nehru authorizes project Phoenix, a plan to build a spent fuel reprocessing plant with a capacity to reprocess 20 tons of fuel a year, which is calculated to match the production capacity of CIRUS.

—India's Nuclear Weapons Program, "The Beginning: 1944-1960," www.fas.org.

6 September 1958

In a statement before the Second International Atomic Energy Agency (IAEA) General Conference, Dr. Bhabha asserts that either a 150 or 250MW nuclear power station could easily function at a "high load factor" as part of

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the Bombay power grid. Dr. Bhabha assumes that Indian nuclear plants will operate at 80 percent load factors.

—J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), p. 87; Roberta Wohlstetter, "*The Buddha Smiles*": *Absent-Minded Peaceful Aid and the Indian Bomb* (Los Angeles: Pan Heuristics, 1977), p. 48.

November 1958

In an article in the *Economic and Political Weekly* of Bombay, British economist I.M.D. Little examines Dr. Bhabha's assertions about the economic feasibility of nuclear power in India. Little concludes that nuclear plants would not be "economically advantageous" in India.

—I.M.D. Little, "Atomic Bombay? A Comment on 'The Need for Atomic Energy in the Underdeveloped Countries'," *Economic and Political Weekly* (Bombay), November 29, 1958, p. 1483, cited in Wohlstetter, "*The Buddha Smiles*," pp. 46-47.

Late 1958

The activities of the Trombay Atomic Research Centre are divided into six divisions: (1) the education and training division, which is responsible for overseeing the training school and awarding grants for nuclear research to outside educational institutions; (2) the production division, which is in charge of the uranium metal plant to convert "uranium concentrates" into nuclear metal scheduled to commence operation in 1959, a fuel fabrication plant to produce fuel elements for all the reactors also scheduled to come on line in 1959, and a plutonium extraction plant to remove plutonium from the reactors and separate it from the uranium fuel elements through a chemical process; (3) the research division, in charge of physics, chemistry, radio-chemistry, reactor control and electronics sections; (4) the engineering division, which oversees a metallurgy section that conducts work on nuclear materials and the fabrication of fuel elements, a reactor engineering section and a chemical engineering section; (5) the biology and medical group, which researches the effects of atomic radiation; and (6) the atomic minerals division, which assumes the responsibility for atomic mineral surveying and prospecting in its entirety.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 99.

1957

A "small" plant for domestic fabrication of heavy water is commissioned.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 101.

20 January 1957

In a speech delivered at the Atomic Energy Commission (AEC) in Trombay, Dr. H. Bhabha calls for power reactors to also be used for the production of fuel to be used in future reactors. He remarks, "It is likely that in the future more advanced and efficient types of atomic power stations will use concentrated atomic fuel, such as uranium-235, uranium-233, or plutonium, rather than the naturally occurring uranium. If we are not to depend on the import of such fuel from abroad, and not to build a gaseous diffusion plant involving an enormous expenditure and technical effort, it is necessary for us to start producing this fuel now by converting natural uranium into plutonium, and thorium into uranium-233 in atomic reactors. If we are therefore, not to lose further ground in the modern world, it is necessary for us to set up some atomic power stations within the coming five years, which will produce plutonium for our future power reactors, in addition to producing electricity now."

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—B.V. Sreekantan, Virendra Singh, and B.M. Udgaonkar, eds., *Homi Jehangir Bhabha: Collected Scientific Papers* (Bombay: Tata Institute of Fundamental Research, 1985), p. 975.

20 January 1957

Prime Minister Nehru states that "whatever the circumstances, we shall never use this atomic energy for evil purposes. There is no condition attached."

—Nehru quoted in G.G. Mirchandani, *India's Nuclear Dilemma* (New Delhi: Popular Book Services, 1968), p. 230.

27 February 1957

In an attempt to improve Indo-US relations, Eisenhower administration officials decide to "actively encourage India to [consider] US offers for bilateral assistance in the atomic reactor field," emphasizing the decision to declassify information related to nuclear power reactors. The also propose training programs for Indian atomic energy specialists.

—US National Security Council, Operations Coordinating Board, memorandum, "Outline Plan of Operations with Respect to India and Nepal," February 27, 1957, p. 1, in *US Nuclear Non-Proliferation Policy, 1945-1991*, ed. Virginia I. Foran (Alexandria, Va.: National Security Archive/Chadqyck-Healy, 1991), no. 00290.

24 July 1957

During a discussion on the Department of Atomic Energy (DAE) budget at the Lok Sabha (lower house of parliament), Prime Minister Nehru indicates that the budget for atomic energy "increased twelve-fold" between 1954 and 1956.

—*Lok Sabha Debates*, 2d ser., July 24, 1957, col. 4949.

24 July 1957

Prime Minister Nehru makes a speech before the Lok Sabha (lower house of parliament) disavowing an interest in producing nuclear weapons. He says, "we are not interested in making atom bombs, even if we have the capacity to do so, and that in no event will we use atomic energy for destructive purposes." However, he closes his speech by indicating that the future is in the hand of the international community by saying that "if one has these fissionable materials and if one has the resources, then one can make a bomb, unless the world will be wise enough to come to some decision to stop the production of such bombs."

—*Lok Sabha Debates*, 2d ser., July 24, 1957, col. 4954.

August 1957

The Department of Atomic Energy (DAE) establishes a "Training School" to train nuclear scientists and engineers in various disciplines. According to the DAE's Annual Report for 1956-57, 300 scientists and engineers were employed at Trombay. In addition, the Atomic Energy Commission (AEC) begins its own training project at Trombay. In its first year, the training school admits 250 graduate scientists and engineers for year-long courses in physics, chemistry, metallurgy, and engineering.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 11; Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 98.

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1956

In the first supply relationship between the United States and India, the United States agrees to sell 18.9 metric tonnes of heavy water to moderate the CIRU.S. research reactor. As with the Canadian agreement to build the reactor and supply half of the uranium, the United States does not require formal safeguards.

—Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), p. 6.

1956

The Indian delegation to the UN proposes an amendment to the draft statute for the IAEA based on two concerns previously voiced by India's UN representative, V.K. Krishna Menon: (1) that countries such as India should have full say in the constitution and rule setting of an international atomic agency; and (2) the agency should not compel developing countries to assume the role of raw material supplier while it controls reactor operations, reprocessing, "and so forth." The amendment reads: "That the inspection and safeguard provisions should be reasonable and ensure that any aid given by the Agency is not used directly for furthering a military purpose. The inspection and safeguards should not, however, be so rigorous as to give the Agency a hold on the economic life of the country through control of fissionable material or lead to the development of an unhealthy situation in which States in the world receiving aid from the Agency are put into a different class from those who do not go to the Agency for aid."

—Krishna Menon, statements to the First Committee of the United Nations, 17, 22-23 November 1954, reprinted in J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), pp. 4-12, 37-38.

16 March 1956

The United States makes a contract to sell India heavy water for the CIRU.S. Reactor. The agreement states that "the heavy water sold hereunder shall be for use only in India by the government in connection with research into and the use of atomic energy for peaceful purposes..." Under this contract, the United States would provide four shipments of heavy water, the last of which is scheduled for 15 June 1956.

—Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), p. 36.

28 April 1956

India and Canada sign a nuclear cooperation agreement. Under the agreement, Canada agrees to supply half the initial uranium fuel required for the CIRU.S. research reactor.

—Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), p. 6.

4 August 1956

India commissions its first nuclear research reactor, Apsara.

—Department of Atomic Energy, Government of India, "Brief Annual Report: 1962-63," p. 2.

10 August 1956

In a letter to President Eisenhower, the US Atomic Energy Commission (AEC) Chairman Lewis Strauss writes that Dr. Bhabha considers US proposals to strengthen safeguards "as more or less an insult to India's peaceful intentions." Chairman Strauss suggests that the United States should accept current safeguards provisions to preserve its role as supplier to India.

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—Lewis Strauss to President Eisenhower, August 30, 1956, p. 2, Joint Committee on Atomic Energy Files, International Affairs, India, National Archives.

27 September 1956

At a conference on the International Atomic Energy Agency (IAEA) Statute, Dr. Bhabha declares, "We consider it to be the inalienable right of States to produce and hold the fissionable material required for the peaceful power programs." To bolster his critique of safeguards Dr. Bhabha argues that since technologically advanced states, especially those who already possess nuclear weapons, would not need assistance, they would not be subject to safeguards. He says "We will stand on the brink of a dangerous era sharply dividing the world into atomic 'haves' and 'have nots' dominated by the Agency." Commenting on the dual-use nature of nuclear power, Bhabha says, "[T]here are many States, technically advanced, which may undertake with Agency aid, fulfilling all the present safeguards, but in addition run their own parallel programs independently of the Agency in which they could use the experience and know-how obtained in Agency-aided projects, without being subject in any way to the system of safeguards."

—Statement by Homi Bhabha at the Conference on the IAEA Statute, 27 September 1956, in J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), pp. 44-46.

23 October 1956

The IAEA Statute is signed. The final statute requires only that agency safeguards apply to fissile materials and relevant reactors to ensure that they are not diverted for military use. States are allowed to separate and maintain possession of the plutonium that is produced, under safeguards when applicable.

—IAEA Statute, Article XII (A.5), signed 23 October 1956, in J.P. Jain, *Nuclear India*, vol. 2 (New Delhi: Radiant, 1974), p. 38.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 91-92.

1955

Physicist Isador Rabi, chairman of the US Atomic Energy Commission's General Advisory Committee, conveys his concerns about India's intentions in a discussion with the US State Department's atomic energy adviser, Gerard Smith. Chairman Rabi states that safeguards must be instated prior to operating the reactors that are constructed abroad. He believes that the US manufacturers had not considered this problem and that even a country like India could construct weapons once it was able to produce plutonium.

—Smith memorandum for file, September 14, 1955, *Foreign Relations of the United States 1955-1957*, vol. 20, p. 1981, cited in Peter A. Clausen, *Nonproliferation and the National Interest* (New York: HarperCollins College, 1993), p. 34; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 31.

1955

India begins implementation of Dr. Bhabha's three-stage atomic energy plan with the construction of the Apsara research reactor, located at Trombay. The design for this reactor is based on British engineering drawings. [Note:

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Apsara was the first nuclear reactor in Asia (outside of the Soviet Union) to go critical.]

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 85.

1955

The United States begins training foreign nuclear scientists and engineers and declassifying "thousands" of papers and reports on matter such as plutonium reprocessing. India avails itself to both forms of assistance.

—Roberta Wohlstetter, *"The Buddha Smiles": Absent-Minded Peaceful Aid and the Indian Bomb* (Los Angeles: Pan Heuristics, 1977), p. 30.

1955

Dr. Bhabha proposes to Prime Minister Nehru that India publicly renounce nuclear weapons. In response, Nehru says that the discussion should be continued "on the day when India was ready to produce one."

—Bertrand Goldschmidt, *The Atomic Complex* (La Grange Park, Ill.: American Nuclear Society, 1982), p. 185.

Early 1955

Members of the US Joint Committee on Atomic Energy visit India to promote the expansion of peaceful applications of atomic energy. This meeting paves the way for an Indo-US agreement under which the United States agrees to supply India with heavy water to moderate the planned Canada-India Reactor, also known as the Canada-India Reactor, U.S., or CIRU.S. This agreement is reached to hedge the possibility that India's own Nangal heavy water plant may fail to operate sufficiently. Under this agreement, the United States sells India ten tons of heavy water. [Note: CIRU.S., now commonly written as Cirus, is a 40MW research reactor that is fueled with metal uranium and moderated with heavy water. Reliance on this type of fuel necessitates irradiating the fuel for a relatively brief period of time before its removal. The process of "low burn up" results in the production of significant quantities of weapons-grade plutonium. The plutonium reprocessed from the CIRU.S. reactor's spent fuel was used in India's first nuclear device test in May 1974.]

—Roberta Wohlstetter, *"The Buddha Smiles": Absent-Minded Peaceful Aid and the Indian Bomb* (Los Angeles: Pan Heuristics, 1977), p. 32; K.K. Pathak, *Nuclear Policy of India* (New Delhi: Gitanjali Prakashan, 1980), p. 49; George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 29.

15 January 1955

Dr. H. Bhabha writes Sir Crockcroft about the fruits of British-Indian cooperation in the development of nuclear reactors. He states "one might be in a position to discuss seriously an atomic power station for India by the middle of 1956 and if things develop as expected, it might be possible to have such a power station in operation in India by 1962."

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 85.

February 1955

The Atomic Energy Commission of the United States agrees to sell ten tons of heavy water to India for use in the nuclear research reactor under construction at Trombay.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 89-90.

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29 March 1955

Indian defense minister, Dr. Katji, declares before the parliament that "There has been a great deal of talk about nuclear weapons, atomic energy and all that. We do not want them. Our whole foreign policy is based on it. We hate bombs, atom bombs and hydrogen bombs and it would be ridiculous, I suggest, for India with its declared policies and its very limited resources to think on these lines at all."

—*Lok Sabha Debates*, Vol. 2, Part 2, 29 March 1955, col. 3599, in Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 93.

July-August 1955

Prime Minister Nehru persuades the leaders of the international community to elect Dr. H. Bhabha as president of the first UN Conference on the Peaceful Uses of Atomic Energy, which takes place in Geneva in July-August. This conference facilitates the dissemination of newly declassified papers containing technical information on atomic energy. In his paper submitted to the Conference, Dr. H. Bhabha delineates the basic strategy for the Indian atomic energy program. This paper argues that, although the limited resources for conventional power in India would be sufficient to maintain industrialization over the next few decades, they would not suffice to maintain a standard of living on par with the most industrially advanced nations. He claims that atomic power stations would be competitive with thermal power stations in remote areas due to the high cost of transporting coal, which is contributing to the already overburdened transportation industry. Dr. H. Bhabha reaches the conclusion that "the necessity of obtaining enriched or pure nuclear fuel (plutonium- or uranium-233) for use in future atomic power stations of a more advanced design required the setting up during the next decade of a few atomic power stations designed to produce these materials as well as electric power. Such stations should be most economically located in areas of the country remote from the coal fields, where there is an urgent demand for power which cannot be met in time from hydroelectric sources." The conference is widely regarded as paving the way for US, Canadian, and British assistance for India's fledgling nuclear power program.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, CA: University of California Press, 1999), p. 30; *Homi Jehangir Bhabha: Collected Scientific Papers*, B.V. Sreekantan, Virendra Singh, and B.M. Udgaonkar, eds. (Bombay: Tata Institute of Fundamental Research, 1985), p. LXIII.

August 1955

Canada offers to build a 40MW research reactor, the CIRU.S., in India. The Canadian offer is made as part of the Colombo plan. Canada also offers to pay all the foreign exchange costs of building the \$14 million reactor (the ultimate cost of the reactor is \$24 million). Ottawa attaches no strict safeguards on the use of the plutonium produced by the reactor, other than the commitment by India, via a secret annex to the agreement, that the reactor and fissile materials it produces would be used only for peaceful purposes. [Note: The Colombo plan was an initiative created at the Commonwealth Conference on Foreign Affairs held in Colombo, Ceylon (now Sri Lanka) in January 1950. The aim of this Conference was to exchange views on the needs of Asian countries. As a result of this meeting, a Consultative Committee was established to assess the needs, available resources, and to create a framework through which international cooperation could be promoted to assist countries in raising their standard of living. In addition to donations and assistance provided by wealthier Commonwealth nations, developing member countries were also encouraged to become donors and participate in economic and technical cooperation

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programs. Initially extended at five-year intervals, the meeting of the Consultative Committee in Jakarta in 1980 decided to extend the plan indefinitely.]

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 92; Brahma Chellaney, *Nuclear Proliferation: The US-India Conflict* (New Delhi: Orient Longman, 1993), p. 6.

October 1955

The United Kingdom Atomic Energy Commission declares that it would be willing to lend India all of the fuel elements necessary for the reactor being constructed at Trombay. The United Kingdom also pledges assistance for the Zerlina zero energy reactor and with new designs for future reactors.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 91-92.

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1954-1950

Late 1954-Early 1955

Britain provides Dr. H. Bhabha with six kilograms of enriched uranium fuel rods, detailed engineering drawings, and other technical data for the construction of a "swimming pool" type research reactor. In return, Dr. H. Bhabha informs his British colleagues that the AEC would consider purchasing a British reactor in the future.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), pp. 84-85.

1954

The Indian government creates the Department of Atomic Energy (DAE), which takes over the execution of Atomic Energy Commission (AEC) policies. Dr. Bhabha becomes a Secretary to the government of India.

—Robert S. Anderson, "Building Scientific Institutions in India: Saha and Bhabha," Occasional Paper No. 11, Centre for Developing-Area Studies, McGill University, Montreal, Canada, 1975, p. 40.

10 May 1954

Prime Minister Nehru reacts negatively to US President Eisenhower's Atoms for Peace plan and exhorts the Indian parliament to support plans to expand India's atomic energy activities. In the same speech, he declares that "the use of atomic energy for peaceful purposes is far more important for a country like India, whose power resources are limited, than for a country like France, an industrially advanced country."

—"Control of Nuclear Energy," speech to the Lok Sabha, May 10, 1954, in *Jawaharlal Nehru's Speeches*, vol. 3, p. 254.

Spring-Summer 1954

Dr. H. Bhabha and Dr. Bhatnagar conduct a series of meetings with British officials to request assistance in constructing a nuclear reactor and in converting uranium ores into metal for fabrication.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 84.

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June 1954

Dr. H. Bhabha requests five tons of heavy water for use in a planned Indian research reactor from Britain. The British express reluctance to supply India with heavy water, claiming that their stock is committed to British needs. Dr. H. Bhabha is instead encouraged to approach the vice-president of Atomic Energy of Canada Limited (AECL), former Cambridge colleague W. Bennett Lewis.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 84.

23 September 1954

British atomic scientist Sir John Crockcroft writes a letter to Dr. H. Bhabha to propose a solution to his problems of obtaining heavy water and other assistance for the construction of a research reactor. Sir Crockcroft writes, "Have you considered the possibility of building a research reactor of the 'swimming pool' type? These have been described fairly exhaustively in *Nucleonics* and other publications. They require, of course, enriched uranium but it is possible that this could be made available to you from the UK."

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 84.

September 1954

Dr. H. Bhabha replies to Sir Crockcroft's letter stating his receptiveness to the suggestion of developing a swimming pool-type reactor. He writes, "I would like to know how much enriched uranium it would be possible to make available, and the terms and conditions including time schedules under which it could be made available. The time element is very important, since we would like to undertake such a reactor if it could be set up in a very short time, so we have something to work with while our other plans mature."

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 84.

26-27 November 1954

Prime Minister Nehru opens the Conference on the Development of Atomic Energy for Peaceful Purposes in New Delhi by saying that atomic energy is "a tremendous tool for the benefit of humanity, whether it is disease or poverty. It therefore becomes necessary for us to try not to lag behind in this, although we may not have the great resources that some other countries have." Prime Minister Nehru also outlines the foreign contacts established by the Indian Atomic Energy Commission. He states, "we have been in fairly intimate touch with a number of countries, with their atomic energy establishments. With others there are no agreements formally, but we are nevertheless in intimate touch. For instance, mention was made of France, the atomic energy establishment there. We have a formal agreement with them and I think this agreement has yielded good results in the most important thing, in our men getting trained in this work, and then coming and working here. Having got training in France or elsewhere, they work with added confidence after seeing actual things being done and not merely reading about them. With the USA, we have an agreement, too; with the United Kingdom, and with Norway and Sweden we have no formal agreements, but we cooperate and are likely to cooperate much more without the necessity of agreement...." Also at this conference, Dr. H. Bhabha presents a three-stage plan to "tap the power of the atom" for economic development. According to this plan, India will first build natural uranium-fueled reactors to produce power and plutonium. The first-stage reactors will be built with Canadian assistance. In the second stage of the plan, reactors will be built to run on a combination of thorium and the plutonium recycled from the first-stage reactors. In the third stage, the uranium produced as a by-product of the combined plutonium-thorium fuel from

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the second stage, would be used to fuel breeder reactors.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 90; G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 158; Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 73.

12 December 1954

Dr. H. Bhabha addresses a joint session of Parliament and expresses concern that at the current rate of energy consumption, the world's existing power sources are likely to run out within the next 350 years. He proposes that tapping nuclear fission would alleviate this problem and assure the world sufficient power supplies for centuries.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 95.

1953

The Atomic Energy Commission (AEC) publishes its annual report for 1952-53. This report states that "easily available and abundant power is the key to all industrialization. India needs cheap power and atomic energy will permit the industrialization for areas remote from cheap sources of coal or hydroelectric power. The objective of the commission is to achieve this ultimately."

—The Ministry of Natural Resources and Scientific Research, "Atomic Energy Commission," *Annual Report 1952-53*, pp. 16-27, in Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 89-90.

13 March 1953

Deputy Minister for Scientific Research, Mr. Malaviya, outlines a seven-point plan for the development of atomic energy in India and states before the parliament that "it was the policy of the government not to employ atomic energy for defense or destructive purposes."

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 90.

July 1953

In Bombay an Indian government-owned company makes preparations to ship two tons of thorium nitrate on a Polish vessel bound for China. The US Ambassador to India, George V. Allen, informs the Indian government that under the US Mutual Defense Assistance Act of 1951, the United States is required to deny military, economic, or financial assistance to any country trading such material with the Soviet Union or its satellites, which includes China. Nehru rejects the US pressure on grounds of sovereignty. Eventually, the dispute is resolved through a compromise proposed by the US Secretary of State John Foster Dulles. India agrees to make a statement that the thorium nitrate is being exported to China for strictly commercial purposes, and that India has reached the contract with China without knowledge of the applicability of the US legislation. In addition, India declares that although it does not accept the US legislation as binding, it has no plans for future shipments of such materials to the Soviet Union or its satellites. The United States agrees to purchase all thorium nitrate that India might wish to export in the future at a mutually acceptable price.

—Robert J. McMahon, *The Cold War on the Periphery: The United States, India, and Pakistan, 1947-1965* (New York: Columbia University Press, 1994), pp. 181-82.

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1952

Prime Minister Nehru unveils a four-year plan to begin developing India's nuclear infrastructure. His plans cover the survey for atomic materials, processing of monazite to obtain thorium and the application of atomic energy in medicine and biology. Dr. Bhabha begins to "discreetly" seek technical information on reactor theory, design, and technology from the United States, Canada, and the United Kingdom, while also negotiating the sale or trade of raw materials such as monazite and beryl ore. [Note: Beryl ore is the source for beryllium, which was considered vital for British and US nuclear weapons at the time.]

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 88; Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), pp. 78-81.

4 October 1952

At a press conference in Madras, Prime Minister Nehru speaks about the values of developing atomic energy. He states, "We are interested in atomic energy for social purposes. Atomic energy represents a tremendous power. If this power can be utilized as we use hydroelectric power, it will be a tremendous boon to mankind, because it is likely to be more available and cheaper than the building of huge hydroelectric works. Therefore, we are interested in the development from the social point of view."

—*The Hindu* (Madras), 14 March 1953, cited in Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 90.

24 April 1951

Amidst the US Congressional debate on the India food-grain bill, the Senate approves a bill for \$190 million in grants or gift aid to India while the US House Rules Committee approves a version of the bill to provide a \$190 million loan to India. According to the terms of the loan proposed by the House, India would partially repay the sum in "strategic materials." India's stated intention of refining the sands, keeping the thorium for itself, and selling the other "rare earth compounds" to the United States proves unpopular; several US congressmen and senators express their support for leveraging the food-grain bill to bring an end to the Indian ban on the sale of its monazite sands.

—Robert J. McMahon, *The Cold War on the Periphery: The United States, India, and Pakistan, 1947-1965* (New York: Columbia University Press, 1994), pp. 98-99.

10 May 1951

Despite initial resistance to the food-grain bill on grounds that it infringes on Indian sovereignty, Prime Minister Nehru states before parliament that India will agree to the terms of either the House or Senate bill, with a preference for the loan proposed by the House. In regard to "strategic materials," he expresses opposition to ending the embargo on the export of monazite sands by saying that India will provide such materials as are available and may be spared by India, with the exception of those materials that may be utilized to produce atomic weapons.

—Robert J. McMahon, *The Cold War on the Periphery: The United States, India, and Pakistan, 1947-1965* (New York: Columbia University Press, 1994), p. 100.

15 June 1951

President Truman signs into law a compromise food-grain bill agreed upon by both the House and Senate that

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closely follows the original House bill and leaves the term "strategic materials" unspecified. This compromise language allows India's monazite export embargo to continue unchallenged.

—Robert J. McMahon, *The Cold War on the Periphery: The United States, India, and Pakistan, 1947-1965* (New York: Columbia University Press, 1994), p. 101.

24 March 1950

Minister for Scientific Research, Sir Prakasa, emphasizes to parliament that Indian governmental policy does not include atomic weapons production.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), pp. 89-90.

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1949-1932

1949

The Indian permanent representative to the United Nations, Sir Benegal Rau, is appointed to chair an 11-member sub-committee tasked with designing a compromise proposal to restrict the spread of nuclear weapons. The plan devised by Sir Benegal's ad hoc committee proposes that the General Assembly call upon the International Law Commission to formulate a draft declaration on conduct in regard to nuclear energy development to promote peaceful uses and to eliminate nuclear weapons from national arsenals.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 45.

1949

Rare Earths Limited, a joint-venture company financed by the India's federal government and the government of the state of Travancore-Cochin, enters into contracts with two French firms, the Societe de Produits Chimique and the Banque Marocaine de Credit, for the construction of a facility at Alwaye, Travancore to extract thorium from the monazite sands that abound in that region. Dr. H. Bhabha receives a nomination to the company's board of directors.

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 87.

23 March 1949

Responding to questions about nuclear research posed in the Indian parliament, Prime Minister Nehru states "We are not thinking in terms of atomic bombs. We are thinking in terms of processing various minerals out of which atomic energy comes. Probably we shall be subjecting these minerals to this processing and use the energy for research work."

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 89.

April 1948

Dr. H. Bhabha writes a note entitled *Organisation of Atomic Research in India* to Prime Minister Nehru, in which he expresses his view that "the development of atomic energy should be entrusted to a very small and high powered body composed of say, three people with executive power, and answerable directly to the Prime Minister without

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any intervening link. For brevity, this body may be referred to as the Atomic Energy Commission." Dr. H. Bhabha also indicates his opinion that the existing Board of Research on Atomic Energy is not an appropriate body to manage such matters because it must report to the 28-member Governing Body of the Council for Scientific and Industrial Research (CSIR), which would compromise its ability to maintain confidentiality. In addition, Dr. H. Bhabha recommends that the Board of Research on Atomic Energy be abolished when the AEC is formed. He then requests approximately 10 million rupees for the Commission to use over the next four years, permission from the Prime Minister to continue negotiations with Britain, France, and Norway under complete secrecy, and permission to prepare bilateral agreements with each country, which would be submitted to the Indian government upon completion.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), pp. 145-146; Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 60.

April 1948

The Indian government assumes direct responsibility for the atomic energy sector. Prime Minister Nehru introduces the Atomic Energy Act before India's Constituent Assembly to create an Atomic Energy Commission (AEC) and the legal framework for its operation. The act, modeled on Britain's Atomic Energy Act, calls for research and development of atomic energy in "complete secrecy." It establishes government ownership of all pertinent raw materials, particularly uranium and thorium. In the ensuing legislative debate over the level of secrecy, Nehru argues that secrecy is necessary to protect Indian materials and "know-how" from exploitation by the industrialized countries and to assure the United States and United Kingdom that if they cooperate with India in this field, their secrets would be protected. In response to parliamentarian S.V. Krishnamurthy Rao's criticism that "secrecy in the UK [United Kingdom] is restricted only for defense purposes," Nehru responds, "I do not know how you are to distinguish between the [defense and atomic energy purposes]." Nehru further states, "If we are to remain abreast in the world as a nation which keeps ahead of things, we must develop this atomic energy quite apart from war—indeed I think we must develop it for the purpose of using it for peaceful purposes....Of course, if we are compelled as a nation to use it for other purposes, possibly no pious sentiments of any of us will stop the nation from using it that way. But I do hope that our outlook in regard to this atomic energy is going to be a peaceful one for the development of human life and happiness and not one of war and hatred."

—*Constituent Assembly of India (Legislative Debates)*, 2d sess., vol. 5, April 6, 1948, pp. 3315, 3328, 3333-34, cited in George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley: University of California Press, 1999), p. 18.

7 April 1948

The Board of Research on Atomic Energy of the Council for Scientific and Industrial Research (CSIR) holds a meeting and passes resolutions to encourage the government to establish a nuclear reactor, to allocate 8 million rupees for research and capital equipment, and to establish heavy water capabilities.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 60.

May 1948

Prime Minister Nehru writes a note to his Cabinet to authorize the 10 million rupees requested by Dr. H. Bhabha in April. Nehru agrees with Dr. H. Bhabha's arguments and writes that "any consideration of this matter involves a

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discussion of highly technical processes, many of which are secret." He goes on to explain that atomic research will have a significant social and industrial value and that working in cooperation with other countries would be necessary. He suggests establishing a heavy water plant and, echoing the wishes of Dr. H. Bhabha, he recommends that the Atomic Energy Commission (AEC) should be "a small, high-powered body" that reports directly to his office.

—Itty Abraham, *The Making of the Indian Atomic Bomb*, (London: Zed Books, 1998), p. 60.

16 July 1948

India's Ministry of Defense (MOD) creates the Scientific Advisory Committee with Dr. H. Bhabha, Dr. S.S. Bhatnagar, and Dr. K.S. Krishnan as its members. This Committee is later renamed the Defence Science Advisory Board.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 61.

15 August 1948

Pursuant to the Atomic Energy Act, the Atomic Energy Commission (AEC) is established. The Department of Scientific Research is responsible for both the Atomic Energy Research Committee and the AEC. The three-member AEC is composed of the same members as the Scientific Advisory Committee: Dr. H. Bhabha, Dr. K.S. Krishnan, and the director-general of CSIR, Dr. S.S. Bhatnagar. The AEC is placed under the "direct personal oversight" of the prime minister.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 61.

1946

Prime Minister Nehru writes a series of notes to the Cabinet and other state agencies to prevent the export of "atomic material," including the monazite sands.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 58.

1946

Prime Minister Nehru nominates Dr. H. Bhabha as the scientific adviser to the Indian government. In effect, this decision acknowledges Dr. H. Bhabha as the national expert on atomic energy.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 58.

1946

The Indian government forms the Atomic Energy Research Committee with Dr. H. Bhabha as its Chairman. This committee functions as part of the Council for Scientific and Industrial Research (CSIR) and focuses on promoting education in nuclear physics in Indian colleges and universities. Dr. H. Bhabha uses his position with this organization to consolidate his political position and advise Interim Government Cabinet leader Jawaharlal Nehru more closely on matters related to atomic energy.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 145.

1946

The Council for Scientific and Industrial Research (CSIR) provides the Tata Institute of Fundamental Research (TIFR)

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with 75,000 rupees.

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 67.

1946

During the debate on the Baruch Plan in the United Nations, India resists the idea of international ownership of fissile ores such as uranium and thorium. The leader of the Indian delegation to the General Assembly, Ms. Vijaylakshmi Pandit, argues that such control would deprive India of an important economic asset in the future. In general, India supports the principle of ensuring that nuclear materials and capabilities will be used only for peaceful purposes, but resists any measures that would allow some states to retain nuclear weapons while denying others the full freedom to use their resources as they see fit. [Note: Under the Baruch Plan, proposed in mid-1946 by the United States, all nuclear resources would be internationally owned and managed. Under this plan, the United States would give up its nuclear weapons program only after all other states had placed their nuclear programs under international control.]

—Shyam Bhatia, *India's Nuclear Bomb* (Ghaziabad: Vikas, 1979), p. 43; Center for Nonproliferation Studies, "Treaty on the Nonproliferation of Nuclear Weapons: History," NPT Tutorial, <http://cnsdl.miis.edu>.

May 1946

The Council for Scientific and Industrial Research (CSIR) expresses its support for Iyer's ban on the export of its monazite sands. In a press release, the Board of Atomic Energy notes its appreciation for "the measures being taken in Travancore to preserve the nation's national resources."

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 58.

26 June 1946

Leader of the Interim Government Cabinet, Jawaharlal Nehru, delivers a speech in Bombay in which he discusses atomic bombs. He says, "It [is] a very grave responsibility for any country [to use] atomic bombs. A very great responsibility rests with the United States. It justified the use of [the] atomic bomb on the ground that it stopped [the] war, but by unleashing such a weapon, it [has] created a dangerous situation. The atomic bomb brought a measure of hope also. Faced with such a destructive weapon, people might wake up...[As] long as the world [is] constituted as it [is], every country [will] have to devise and use the latest scientific devices for its protection. [I have] no doubt that India [will] develop her scientific researches and [I hope] Indian scientists [will] use the atomic force for constructive purposes. But if India [is] threatened, she [will] inevitably try to defend herself by all means at her disposal. [I hope] India, in common with other countries, [will] prevent the use of atomic bombs."

—Dorothy Norman, ed., *Nehru: The First 60 Years*, vol. 2 (New York: John Day, 1965), p. 264.

1945

To increase his influence, the Dewan of the princely state of Travancore, C.P. Ramaswamy Iyer, allows the minerals attaché of the US Embassy to survey the region's monazite sands in the hopes of attracting bids from US firms for concessions. These sands are sought by a number of countries, including the United States, because when processed, they yield a number of "rare earth compounds" including thorium. [Note: Prior to the Second World War, these sands had been extracted by the United States, Britain, France and Germany for use in the gas mantle and lamplight industry; however, after the start of the war, the India's War Trade Intelligence Department

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tightened control for fear that Germany would attempt to refine the sands for thorium. The Indian Atomic Energy Act of 1948 classifies thorium as a source material for atomic energy.]

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 57.

14 April 1945

The Tata Board of Trustees meets to formally consider Dr. H. Bhabha's proposal. The trustees agree to fund the Tata Institute of Fundamental Research (TIFR) with a budget of 80,000 rupees. The Tata Trust determines that responsibility for financing and managing the institute should be balanced between Bombay University and the local government.

—George Perkovich, *India's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley: University of California Press, 1999), p. 16; G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 114; B.V. Sreekantan, Virendra Singh, and B.M. Udgaoankar, eds. *Homi Jehangir Bhabha: Collected Scientific Papers* (Bombay: Tata Institute of Fundamental Research, 1985), p. LV.

1 June 1945

Dr. H. Bhabha becomes the first director of the Tata Institute of Fundamental Research (TIFR), which begins operations in Bangalore.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 114.

End of August 1945

The two nuclear bomb explosions in Japan confirm Ramaswamy Iyer's impression of the value of thorium to foreign interests. He informs US minerals attaché Corry of his intention to ban the export of monazite from Travancore, except that which is necessary for "war needs."

—Itty Abraham, *The Making of the Indian Atomic Bomb* (London: Zed Books, 1998), p. 57.

December 1945

Dr. H. Bhabha moves the Tata Institute of Fundamental Research (TIFR) to Bombay. At this time, the institute is provided with 25,000 rupees from the government of Bombay, 10,000 rupees from the government of India, and 45,000 rupees from the Tata Trust.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 114.

March 1944

Dr. Homi Bhabha writes a grant request to the Sir Dorab Tata Trust to seek funding for the creation of an Indian institute to conduct fundamental research in the nuclear field.

—Sir John Cockcroft, "Homi Jehangir Bhabha, 1909-1966," pt. 4, *Proceedings of the Royal Institution* 41, no. 191 (1967) in B.V. Sreekantan, Virendra Singh, and B.M. Udgaoankar, eds. *Homi Jehangir Bhabha: Collected Scientific Papers* (Bombay: Tata Institute of Fundamental Research, 1985), p. 958.

1942

The British government creates the Council for Scientific and Industrial Research (CSIR) to carry out the science related activities of the Indian government to support the war effort.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 144.

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1934

Indian physicist Dr. Homi Bhabha receives an Isaac Newton Studentship which enables him to visit the institutes and laboratories of key European theoretical physicists. During the three-year period of his studentship, he works and studies at Cambridge and also at the Institute of Theoretical Physics in Copenhagen, Denmark with Niels Bohr and James Franck.

—Robert S. Anderson, "Building Scientific Institutions in India: Saha and Bhabha," Occasional Paper No. 11, Centre for Developing-Area Studies, McGill University, Montreal, Canada, 1975, p. 14; Sir John Cockcroft, "Homi Jehangir Bhabha, 1909-1966," pt. 4, *Proceedings of the Royal Institution* 41, no. 191 (1967) in B.V. Sreekantan, Virendra Singh, and B.M. Udgaonkar, eds. *Homi Jehangir Bhabha: Collected Scientific Papers* (Bombay: Tata Institute of Fundamental Research, 1985), p. 956.

1932

Indian physicist Dr. Homi Bhabha wins the Rouse Ball Traveling Fellowship, which he uses to visit and work with physicists Wolfgang Pauli in Zurich and Enrico Fermi in Rome.

—G. Venkataraman, *Bhabha and His Magnificent Obsessions* (Hyderabad: Universities Press India, 1994), p. 5.

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